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ABSTRACT

The seven articles in this annual report concern aspects of attachment, social interaction among parents and children, temperament, affective behavior, and/or research methodology. Aspects of attachment and temperament are addressed in Kazuo Miyake's study of the "Relation of Temperamental Disposition to Classification of Attachment," and Yuko Kanaya's exploration of "The Relation between Mother-Infant Interactional Characteristics in Early Infancy and Later Attachment as Assessed in the Strange Situation." Social interactions in American families are the focus of Michael E. Lamb's "Comparison of 'Second Order Effects' Involving Parents and Siblings." Communicative behavior and emotional expression are the topics of Shing-jen Chen's investigation of "Maternal Affective Expression and Infant's Mood in a Laboratory Situation." Affective behavior and behavioral inhibition were investigated in "Individual Differences in Responses to Unfamiliar Objects at Twenty-Three Months of Age," by Shigeru Nakano et al. Keiko Takahashi investigated "Life-Span Development of Affective Relationships." Research methodology and attachment are the topics of Tatsuo Ujiie's "Is the Strange Situation Too Strange for Japanese Infants?" (RH)

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RESEARCH AND CLINICAL CENTER FOR CHILD DEVELOPMENT

Annual Report
1984-1985

PS 016157

Editor : Kazuo Miyake, Director
Assistant Editor : Shing-jen Chen

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A COMPARISON OF "SECOND ORDER EFFECTS" INVOLVING PARENTS AND SIBLINGS

Michael E. Lamb
University of Utah

Sixty twelve-month-old infants were observed interacting with their parents in four social contexts : One parent present, two parents present, one parent and preschool-aged sibling present, and two parents and sibling present. Analyses revealed : a) that infants directed fewer behaviors to either parent when both were present than when only one was present ; b) that infants directed fewer behaviors to either parent when the sibling was present than when s/he was absent ; c) that a sibling's presence did not inhibit the infants' behavior as much as a parent's presence did ; d) that the presence of the other parent or the sibling led parents to vocalize to their infants less ; e) that the sibling's presence inhibited the parent's behavior less than the other parent's presence ; and f) that the presence of a fourth person did not inhibit interaction significantly more than the presence of a third person.

A COMPARISON OF "SECOND ORDER EFFECTS" INVOLVING PARENTS AND SIBLINGS

Motivated by Bronfenbrenner's (1976, 1979) appeal for researchers to explore "second order effects" in social science, there have been several published reports concerning the impact of a third person's presence on interaction within a dyad (see Lamb, 1979, for a review). The results of these studies have been remarkably consistent. Parents and infants interact more when the dyad is alone than when the other parent is also present (Clarke-Stewart, 1978 ; Lamb, 1976a, 1976b, 1977a, 1978b ; Pedersen, Anderson, & Cain, 1980). Analogously, Rosenblatt (1974) found that interaction within the mother-father dyad was inhibited by the presence of their child. The present study was designed to explore second-order effects in family groups comprising not only mothers, fathers and infants, but young siblings as well. We wished to determine whether the presence of a sibling inhibited the parent-infant dyad in the same way as the presence of the other parent/spouse did, and whether the sibling's presence modulated the effect of the second parent's presence on parent-infant interaction. In addition, we wanted to determine whether the presence of a fourth person affects triads in the same way that the presence of a third person affects dyads. To address these questions, we reanalyzed data from two previous studies (Lamb, 1978a, 1978b). The potential importance of such research has been described by Lamb (1979), who pointed out that an understanding of the effects of the social context on dyadic social interaction was a prerequisite to understanding the formative significance of social interaction.

Hildy Feen, Cindy Neff, Lisa Heidelberger and Steve Neren assisted in the collection of the data. Correspondence and reprints requests should be addressed to Michael E. Lamb, Department of Psychology, The University of Utah, Salt Lake City, Utah 84112, USA.

Editor's note : As a visiting professor of the Japanese Ministry of Education, Science and Culture, Dr. Lamb stayed for two months in 1985 at the RCCCD, working with Professor Miyake and his collaborators and giving a series of lectures, and seminars.

METHOD

Subjects

Sixty 12-month-old infants and their families participated in this research. Thirty-six of the infants were observed with their mothers and fathers (Lamb, 1978b), and twenty-four were observed with their mothers, fathers and preschool-aged siblings (Lamb, 1978a). The siblings ranged in age from 30 months to 58 months, with a mean of 41 months and a median of 43 months. The samples were composed of equal numbers of male and female infants and siblings. Families were recruited from birth announcements published in the local newspaper ; 44% of the families contacted agreed to participate. Three-quarters of the fathers had upper or upper-middle class occupations (Hollingshead, Note 1). This over-representation of high social status families reflects the demographic characteristics of the University town in which this research was conducted.

Procedure

The mother-father-infant triads and the mother-father-sibling-infant groups were observed in a 6m x 7.5m laboratory playroom, equipped with ceiling-mounted microphones and one-way observation windows along one wall. The playroom contained two chairs for the parents (2.1m apart), a couch, a table, and 26 toys, laid out in standard locations around the room. One toy was 1.2m from both parents ; all other items were at least 2m away.

The infants or sibling-infant dyads were observed in three contexts : once with just mother (M) present (8 minutes), once with father (F) present (8 minutes), and once with both parents (MF) present (8 minutes). The three episodes were combined in all possible sequences, with equal numbers of male and female infants, and near-equal representation of all sex of sibling by sex of infant permutations within each sequence. There were 6 episode sequence permutations (M, F, MF ; M, MF, F ; MF, M, F ; MF, F, M ; F, M, MF ; F, MF, M). Six mother-father-infant triads and four mother-father-sibling-infant groups were observed under each procedure. The parents were instructed to be responsive but to refrain from initiating interaction with either of the children. They were encouraged to chat to their spouses normally when in the room together.

From behind the one-way observation windows, an observer recorded the infant-parent interaction while an associate filmed a videotape record of the interaction. Consequently, observer reliability could be monitored throughout the study. The observer used a modified event recorder which produced an audiotaped signal for subsequent computerized transcription (Stephenson, Smith, & Roberts, 1975). S/he recorded the behavior directed by the infants to their parents using the observational categories defined by Lamb (1976b). Five affiliative behaviors (smile, vocalize, look, laugh, proffer) and five attachment behaviors (proximity, touch, approach, ask to be held, fuss) were recorded, as was the occurrence of adult vocalization to the child. Observers also noted when the adults vocalized to the siblings. In a pilot study involving 12 families, we found that parental vocalization was the most reliably recorded measure of the parents' involvement in interaction and that scores on this measure were highly correlated with other indices (e. g., offering toys, smiling). Proximity and touch were duration measures (representing the number of seconds over which the state extended) since the observers recorded both the initiation and termination of these states. All other measures were frequency counts, scored once each time the behavior occurred.

Reliability

One of three observers conducted each of the observations. All three had experience observing infants and young children. During the course of the study, observer reliability was repeatedly assessed by requiring an observer to rescore from videotape the behavior of a child previously observed by another observer. A total of 23 reliability assessments were made. Coefficients of inter-observer agreement -computed in the manner described by Eckerman, Whatley, and Kutz (1975) and Lamb (1976b, 1977a)- ranged from .62 (infant vocalize), to .94 (ask to be held), with a mean of .78 and a median of .77. With one exception, all coefficients were above .70. Reliability was equivalently high in the dyadic, triadic, and four-person situations.

RESULTS

Infant behavior toward parents

An initial multivariate analysis of variance (MANOVA) revealed no significant differences in infant behavior related to infant sex, sex of sibling, or sex of parent. Consequently, the data were combined across the levels of these factors for subsequent analyses.

The mean frequencies of occurrence of the attachment and affiliative behaviors in the four conditions are presented in table 1. Inspection of the data reveals that there was a decline in the amount of interaction with each parent as the number of individuals in the room increased. Multivariate analyses revealed that, irrespective of the presence or absence of a sibling, the entrance of a second parent significantly reduced the frequency of

TABLE 1

Mean Frequencies of Attachment and Affiliative Behaviors to Parents in Various Social Contexts

Significant Situation-Related Differences

Behavior	One Parent only (1)	Difference between (1) and (3) (2)	Two Parents only (3)	Difference between (3) and (5) (4)	One Parent and Sibling (5)	Difference between (5) and (7) (6)	Two Parents and Sibling (7)	Difference between (1) and (5) (8)	Difference between (3) and (7) (9)
Smile	1.92		1.87		2.30		2.44		
Vocalize	3.71	*	2.48		3.18		2.48		
Look	9.95	* * *	6.75	+	8.26	+	6.88	+	
Laugh	0.05		0.17		0.38		0.66	*	
Proffer	1.79	*	0.99		0.48		0.38	* *	+
Proximity	138.50	* *	75.60		81.02	+	47.30	* *	+
Approach	2.48	*	1.64		1.76		1.48	+	
Touch	38.98		22.74		9.96		6.94	* *	
Seek to be held	0.32				0.20		0.10		
Fuss	0.31		0.28 0.32		0.70		0.20		
Multivariate comparison		* * * *		*		n.s.		* * *	n.s.

Note: All figures reflect mean frequencies per parent.

* * * * $p < .0001$ * $p < .05$

* * * $p < .001$ + $p < .10$

* * $p < .01$

social behavior directed by infants to their parents ($p<.0001$). Significant effects were evident on five of the ten univariate analyses (vocalize, $p<.025$; look, $p<.0001$; proffer, $p<.04$; proximity, $p<.0003$, approach, $p<.025$). All other measures except smile (no change) and laugh (increase) showed nonsignificant changes in the same direction.

Similarly, irrespective of the number of parents present, the presence of a sibling led to a decrease in the occurrence of infant behaviors ($p<.0001$). Univariate tests showed declines in the frequency of proffering, $p<.0003$, proximity, $p<.0025$, touch, $p<.0025$, and approach, $p<.11$. There were non-significant declines in the occurrences of vocalize, look, and seek to be held. On the other hand, there were increases in the frequency of laugh, $p<.07$, fuss, n. s., and smile, n. s.. Multivariate and univariate analyses revealed no statistical interactions between the siblingpresence and parent-presence factors.

Subsequent multivariate analyses were computed in order to compare the frequency of infant behavior in the dyadic, triadic, and four-person situations. The analyses indicated significantly lower levels of parentdirected infant behavior in both of the triadic situations (Mother-Father-Infant, $p<.0001$; Either Parent-Sibling-Infant, $p<.0003$) than in the dyadic setting (Either Parent-Infant). The results of the relevant univariate tests are presented in columns 2 and 8 of table 1. However, inspection of columns 6 and 9 reveals that the frequency of infant social behavior was not significantly lower in the four-person situation (Mother-Father-Silbing-Infant) than in either of the triadic settings (multivariate p 's$>.65$). A comparison of the two triadic contexts (see columns 3, 4, 5 of table 1) indicated that infants interacted significantly less with each parent in the Mother-Father-Infant setting than in the Either Parent-Sibling-Infant setting ($p<.04$) although only one univariate test revealed a marginal effect.

Parental Behavior

The data provided in table 2 suggest that the behavior of the parents was affected dramatically by the siblings' presence. Parents vocalized far less to the infants when the siblings were present than in either the one-or two-parent situation. Most of the parents' attention was directed to the preschooler when s/he was present. However, there were only a chance number of significant correlations between the vocal activity of the parents, and the frequency of attachment and affiliative behaviors directed to them by the infants. Likewise, although one might predict negative correlations between the number of parental vocalizations directed to the preschoolers, and the amount of social behavior directed by

TABLE 2

Mean Frequencies of Parent Vocalization per Episode

	To Infant (No sibling present)	To Infant (Sibling present)	To Preschooler (Infant present)
One parent present	19.1a	3.3b	19.6a
Two parents present	7.2c	2.3d	9.4c

Mothers and fathers behaved similarly, and the entries represent the mean values for mothers and fathers. Entries not sharing the same subscript differ from one another on two-tailed dependent t-tests at $p < .01$ level or better.

infants to parents, only a chance number of these correlations were significant. Consequently, the data do not indicate that the effects on the infants' behavior were mediated via an effect of the siblings' presence on the parents.

The results described in the preceding section were unchanged when all the analyses were recomputed using the frequency of adult vocalization to the infant as a covariate.

DISCUSSION

These results replicate earlier findings concerning the effect of a third person's presence on interaction within parent-infant and parent-parent dyads, and demonstrate that these second-order effects occur whether the third person is a parent (Clarke-Stewart, 1978 ; Lamb, 1976a, 1977a, 1978b ; this study), a child (Rosenblatt, 1974), a stranger (Lamb, 1977a), or a sibling (this study). The data showed that the presence of a sibling had an effect that was qualitatively similar to though quantitatively less than the impact of a parent's presence. In both cases, the number of affiliative and attachment behaviors directed by infants to parents declined significantly. By contrast, the entrance of a stranger causes an inhibition of affiliative behavior, but produces an increase in the occurrence of attachment behavior (Lamb, 1977a). It thus appears that the infant's behavior is affected not only by the presence of additional potential interactants, but by the identity of those persons as well.

It is clearly of interest to determine why these effects occur. Other research (e. g., Lamb, 1978a) indicates that infants under 18 months of age engage in very little direct interaction with siblings when observed in the laboratory. Furthermore, there is no correlation between the number of social behaviors directed by infants to their siblings, and the frequency of infant-directed behavior on the part of the siblings (Lamb, 1978a).

Presumably, then, the reduction in the amount of attention paid by infants to their parents when siblings are present does not occur because the infants are preoccupied with their siblings. Instead, the siblings may be occupying the parents' attention, thereby reducing the infants' access to them. Analyses of the frequency of parental vocalization indicated that the siblings were indeed monopolizing the parents' attention. On the other hand, it is important to note that there was no significant relationship between the level of activity of the infants and the number of parental vocalizations directed either to them (where positive correlations might have been expected) or to their siblings (where negative correlations might have been expected). Several other studies have also reported insignificant correlations between the level of parental and infant interactive activity among one year olds (Lamb, 1976b, 1978b) whereas significant correlations are found with older infants (Lamb, 1976a, 1977a). One-year-olds thus appear to be unresponsive to this simple social cue (Lamb, 1979).

Significantly, furthermore, our data showed that the presence of a parent affected the infant's behavior more than the presence of a sibling did, where as the parent's behavior was affected more by the preschooler's than by the spouse's presence. All these factors appear to rule out the possibility that "second order effects" on the infant's behavior were mediated directly via changes in the behavior of either the parents or the siblings. Instead, the salient cue appears to have been the number of persons available for interaction and the identity of the available interactants.

Previous experimental research has focused exclusively on the effects of a third person's presence on interaction within parent-infant or parent-parent dyads. In the present study, we also examined the effect of a fourth person's presence on interaction within triads. The effects did not even approach significance. Since both a sibling's presence and a parent's presence inhibited infant behavior when dyadic situations were transformed into triadic ones, it seems unlikely that the absence of second-order effects in the transition from a three- to four-person-setting was simply due to the identity of the persons concerned. Instead, these results suggest that the addition of two individuals to a dyadic setting has no greater impact on one-year-olds than the entrance of only one person. Among 18-month-olds, however, the entrance of a fourth person indeed inhibits interaction more than the entrance of a third person (Lamb, 1979). Like the absence of correlation between levels of infant and parent activity (see above), these results point to a significant limitation in the sensitivity of young infants to cues provided by the social context. Further exploration of these limitations and their implications might be revealing.

The fact that the siblings' presence affected the infants' behavior less than the parents' presence did is especially interesting in light of the fact that the presence of a strange child affects sibling-infant interaction more than it affects parent-infant interaction (Lamb, 1979). Thus, the entrance of another adult causes an infant to distribute its attention between the adult previously present and the new interactant (i. e., it now interacts less with each adult than before) while the amount of interaction with child interactants is less affected. An analagous distribution of attention occurs when another child rather than another adult enters (cf. Lamb, 1979) : The subject interacts less with the child interactant than before, but interaction with the adults present is hardly affected. These results seem consistent with Harlow's (Harlow & Harlow, 1965 ; Suomi & Harlow, 1978) argument concerning the relative independence of the peer- and adult-infant interactive systems. Further research on developmental changes in the extent to which the systems appear independent of one another would be valuable.

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RELATION OF TEMPERAMENTAL DISPOSITION TO CLASSIFICATION OF ATTACHMENT : COMPARISONS OF THE RESULTS OBTAINED IN TWO INDEPENDENT SAMPLES

Kazuo Miyake
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The objective of this article is to see if the results obtained for Cohort 1 and reported previously under the same title were replicated by the findings obtained for Cohort 2. Two independent groups of infants (Cohort 1 and Cohort 2) that have been followed from birth were observed in a standard Ainsworth Strange Situation when they were 12 months old. Analysis of the assessments made at birth, 7.5 months and 12 months reveals the following results in the two cohorts : (1) Twenty-two Cohort 2 infants were coded Type-B, 8 were coded Type-C and none were coded Type-A. This distribution across attachment categories replicated the one that was found in Cohort 1 (18 Type-B, 11 Type-C and no Type-A). (2) There was a marginally significant trend in both cohorts toward crying among a majority of Type-C babies in RIS (response to interruption of sucking) task. (3) Observation of the infants' behavior to the entry of a male stranger and temporary separation from their mothers at 7.5 months revealed more signs of fear behavior on the part of Type-C than Type-B infants in both cohorts.

It was concluded that the findings reported previously for Cohort 1 were replicated by results obtained for Cohort 2.

Key words : attachment classification, infant temperament, neonatal cry.

INTRODUCTION

We have, in our longitudinal study of 29 middle-class Japanese infants, attempted to identify early temperamental dispositions that predict later attachment classification (Miyake et al, 1983, 1985). Specifically, Ainsworth Strange Situation observations at 12 months of age were preceded by, among others, : (1) Observation of distress evident in newborns when a nipple is removed (cf. Bell, Weller, and Waldrop, 1971), and (2) An observation of reaction to a stranger and separation distress, as well as an observation of mother-infant interaction at 7.5 months. These assessments revealed differences between Type-B and Type-C infants (there were no Type-A infants) with regard to the tendency to be distressed in the newborn period and to become fearful at 7.5 months. Specifically, we found that a large proprotion of the infants who had been classified as Type-C had shown

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The author would like to thank Donna L. Bradshaw, Shing-jen Chen, Kimiharu Satoh, Tatsuo Ujiie and Yuko Kanaya for their assistance in data analysis.

much crying in the neonatal period and fearfulness at 7.5 months, as compared to infants who had been classified as Type-B.

Our findings indicated that the attachment classification is not totally independent of the infant's temperamental disposition. However, the likelihood of a relationship between the infant temperament and the mother's mode of interaction cannot be ruled out yet.

We started the testing of a second cohort of mother-infant pairs in Sapporo in 1982 in expectation of obtaining data relevant to several issues : confirmation of the findings obtained for Cohort 1 ; increase in the number of longitudinal subjects ; and interaction between infant temperament and maternal interactional disposition in accounting for the patterns of attachment at 12 months of age.

In this report, we will present some of the longitudinal data obtained for Cohort 1 and Cohort 2 to see if the results obtained for Cohort 2 replicate those results already reported for Cohort 1.

METHOD

Subjects

Twenty-nine infants born in 1980 (Cohort 1) and 30 infants born in 1982 (Cohort 2) were successfully observed in the Ainsworth Strange Situation at 12 months of age. Of these 59 infants, 41 were followed from birth ; the remainder were recruited as supplemental subjects either at 4 months or 11 months of age. All families contacted were predominantly urban middle class living in Sapporo. The fathers were engaged in white-collar or professional occupations and the mothers, at the time of recruitment, planned not to be employed full-time. Infants were firstborn with no serious pre-or peri-natal complications. The number of infants reported in the following sections varies from period to period, since not all subjects were successfully tested at each observation.

Procedures

Assessments were made during the newborn period, and at 1, 3, 7.5 and 12 months of age for Cohort 1, whereas Cohort 2 infants were tested or observed during the newborn period, and at 2, 4, 7.5 and 12 months.

The assessments to be discussed in this report are restricted to those taken in both cohorts since our objective is to see if the findings from the first cohort are replicated by those from the second.

1. *Newborn assessments.* The reaction of infants to the interruption of sucking produced by the removal of a nipple was chosen to assess neonatal temperament (cf. Chen, 1985).

2. *Assessments at 7.5 months.* Infants were tested for stranger and separation distress in a sparsely furished room. The procedure consisted of a series of 6 episodes : (a) baseline, (b) stranger entry, (c) mother departure, (d) stranger departure, (e) stranger re-entry, and (f) reunion with mother. On the same day before the 6-episode observation described above, a mother-infant interaction session was videotaped in an unstructured free-play situation lasting for 10 minutes.

3. *Assessments at 12 months.* The Ainsworth Strange Situation assessment was

conducted following the procedure described in Ainsworth et al (1978).

For further details concerning the assessments stated above, readers are referred to our previous report (Miyake et al, 1985).

RESULTS

Attachment behaviors in the Strange Situation at 12 months

In the previous report on our longitudinal study with Cohort 1, Miyake et al. (1985) predicted that the attachment classifications of Japanese infants in the Strange Situation would be very different from those in the United States. Miyake et al. predicted much higher proportion of Type-C infants and much lower proportion of Type-A babies in the Japanese sample as compared with similar American ones. This hypothesis was strongly supported. As seen in table 1, no infants out of 59 tested (29 from Cohort 1 and 30 from Cohort 2) were classified as Type-A babies. Fourteen infants (7 from Cohort 1 and 7 from Cohort 2) were clearly classified as Type-C babies. In addition, five infants were classified as "pseudo-C" infants (a designation conceived by Miyake et al., 1983). These infants show the typical pattern of Type-C babies (such as extreme crying, difficulty in soothing, and moderate levels of resistance upon reunion) during the second separation and reunion, but before then they were B-like, especially in not showing much resistance in the first reunion. The combined C plus pseudo-C group thus totaled 32% of our sample (38% of Cohort 1 and 27% of Cohort 2). Specifically, as shown in table 1, the distributions across attachment categories revealed in the two cohorts is quite similar to each other. We may fairly conclude that the results reported for Cohort 1 were replicated by those obtained for Cohort 2. Prototypical Type-C infants constituted 28% of the 25 Cohort 1 infants and 24% of the 29 Cohort 2 infants who were unambiguously classified.

TABLE 1

Number & Percentage of Attachment Classification

Attachment Classification	Cohort 1 (N=29)	Cohort 2 (N=30)	Cohort 1+2 (N=59)
A	0	0	0
B	18 (72%)	22 (75.9%)	40 (74.1%)
C	7 (28%)	7 (24.1%)	14 (25.9%)
Psuedo-C	4	1	5

Note – Numbers in parenthesis are the percentage of B & C classifications in the total subjects who are unequivocally classified.

Neonatal cry and attachment classification

Nineteen infants in Cohort 1 and 16 in Cohort 2 were tested for RIS successfully during the neonatal period, and then again at 12 months of age for attachment classification. The relation between their response to nipple removal and attachment classification was examined.

As shown in table 2, in both cohorts there was a marginally significant trend toward

TABLE 2

Infant Proness to Show Crying to Nipple Removal and Attachment Classification

Future Attachment Classification	Cohort 1		Cohort 2		Cohort 1+2	
	Crier	Non-Crier	Crier	Non-Crier	Crier	Non-Crier
B	6	5	5	6	11	11
C	7	1	5	0	12	1

more Type-C babies to be criers in the RIS task rather than noncriers (Cohort 1 : chi square=3.13, $p<.10$; Cohort 2 : chi square=3.20, $p<.10$).

By combining the RIS data of the two cohorts, we can obtain a statistically significant trend in the relation between attachment classification at 12 months and a tendency to show crying upon the nipple removal (chi square=4.77, $p<.05$).

Antecedents of attachment classification at 7.5 months

Infants' behavioral disposition toward extreme fearfulness was measured in the laboratory at 7.5 months. Specifically, infants' reactions to a male stranger and to maternal separation were observed. A global judgement of 'Fearfulness' was derived, computed as the presence of avoidance and negative vocalization, together with a decrease in play behavior relative to the baseline prior to the approach of the stranger. As shown in table 3, in Cohort 1, six out of 7 (85.7%) future-C infants were judged to be "fearful", whereas 2 out of 7 (28.6%) future-B infants were similary judged (Fisher's Exact Probability Test, $p<.05$). In Cohort 2, among 7 of the babies classified as C, six (85.7%) were judged to be "fearful", while 6 out of the sixteen (37.5%) babies classified as B were similarly judged (Fisher's Test, $p<.05$). When we combined the results obtained for the two cohorts, the relation between infants' disposition toward fearfulness at 7.5 months and attachment classification at 12 months was statistically significant at the 1% level (chi square=7.18).

TABLE 3

Infant Disposition toward Fearfulress in Lab at 7.5 Months and Attachment Classification

Future Attachment Classification	Cohort 1		Cohort 2		Cohort 1+2	
	Fearful Infants	Non-Fearful Infants	Fearful Infants	Non-Fearful Infants	Fearful Infants	Non-Fearful Infants
B	2	5	6	10	8	15
C	6	1	6	1	12	2

Mother-infant interaction was also observed at 7.5 months and was evaluated from videotapes for four dimensions of maternal responsiveness. The categories were stimulation, effectiveness of stimulation, responsiveness and intrusiveness (any maternal behavior that both interrupted the infant's ongoing activity without a bid by the infant and resulted in a change in the infants behavior). The frequencies of each of these four categories were measured during the 10-minute interaction in the laboratory. In our previous paper on the findings from Cohort 1 (1983), it was reported that mothers of future-B infants were found

to be significaltly less intrusive ($t = 2.54$, $p < .005$) than mothers of future-C infants though both groups of mothers showed eqiuvalent rates of stimulation of their infants, and their stimulation was equivalently effective. This difference in intrusiveness between mothers of Type-B infants and mothers of Type-C infants was not replicated in Cohort 2 (Ms = 1.81 and 3.14, $t = 1.48$, n.s.). We then classified the mothers of both cohorts into two types, namely 'intrusive' and 'non-intrusive' by the median of the frequency of maternal behaviors that indicated intrusiveness.

TABLE 4

Maternal Intrnsiveness in Lab at 7.5 Months and Attachment Classification

Future Attachment Classification	Cohort 1		Cohort 2		Cohort 1+2	
	Intrusive Mothers	Non-Intrusive Mothers	Intrusive Mothers	Non-Intrusive Mothers	Intrusive Mothers	Non-Intrusive Mothers
B	4	6	6	10	10	16
C	6	2	4	3	10	5

As shown in table 4, the level of maternal intrusiveness at 7.5 months was not predictive of later attachment classification (Cohort 1 ; chi square = 2.21, n.s., Cohort 2 ; chi square = 0.77, n.s., Cohort 1 + 2 ; chi square = 2.00, n.s.). According to the assessments of the infants at 7.5 months of age, we may safely say that infant temperamental disposition to become fearful makes an important contribution to attachment classification. However, it is not yet possible to rule out the possibility of an interaction between the infant temperament and the mother's practices. As a prelimiary step to explore the way in which an infant's temperamental disposition acts upon maternal interactional style and vice-versa, the attachment types were broken down by the infants' degree of fearfulness measured at 7.5 months, as well as by the level of maternal intrusiveness. The results are shown in table 5.

TABLE 5

Maternal Intrusiveness × Infant Fearfulness and Attachment Classification

Future Attachment Classification	Cohort 1 Intrusive Mothers		Cohort 2 Intrusive Mothers		Cohort 1+2 Intrusive Mothers	
	Fearful Infants	Non-Fearful Infants	Fearful Infants	Non-Fearful Infants	Fearful Infants	Non-Fearful Infants
B	0	4	1	5	1	9
C	5	1	3	0	8	1

Since the number in each cell is too small, two cohorts were combined for statistical treatment. Among the 9 fearful infant + intrusive mother pairs, 8 (89%) were classified as Type-C at 12 months of age (chi square = 4.0, $p < .05$), whereas 9 (90%) out of 10 non-fearful infant + intrusive mother pairs were classified as Type-B later (chi square = 6.12, $p < .05$). The proportion of Type-C babies relative to Type-B babies was significantly higher for fearful infant + intrusive mother pairs (chi square = 9.61, $p < .01$). When testing the propor-

tion of C to B in the two cohorts separately, we can get marginally significant chi sqare values for both cohorts (Cohort 1 ; chi square=3.75, $p<.10$, Cohort 2 ; chi square=3.35, $p<.10$).

These findings indicate that the effects of the mother's intrusiveness are indeed different, according to the level of the infant's tendency to become fearful. Thus we may fairly conclude that infant temperamental disposition toward fearfulness makes a major contribution to later attachment classification, whereas maternal intrusiveness plays a minor role.

DISCUSSION

After referring to our Cohort 1 study in his review paper, Sroufe (1985) argues that :

> The "Traditional" Japanese mother never leaves her infant alone-even briefly-over the entire course of the first year. It is understandable then that they would be thoroughly distressed when left alone in a strange setting. The Strange Situation was designed to be a mild "every day" stressor. Clearly, in the context of traditional Japanese culture, it is a stress situation of great magnitude, qualitatively different from all but the most unusual American cases. Moreover, in their effort to duplicate Ainsworth's procedure, the investigators allowed the separations to go on for 3 minutes regardless of amount of distress, rather than cutting the separations short, as is done here. Many infants will cry without readily settling if stressed enough. Given these distortions in the intent of the Ainsworth procedure, these assessments cannot be valid predictor of home attachment behavior (valid assessment of attachment)..... (p. 6)

First, we do not think our subjects were reared according to traditional patterns. In fact, they live in Japanese middle class families in Sapporo, one of the most modernized large cities in Japan (where the divorce rate is the highest among Japanese cities). Second, with Cohort 2, episode 6 (and in some cases, episodes 4 and 7 as well) was curtailed if the baby was unduly distressed. This resulted in a negligible decrease of the percentage of prototypical C infants among Cohort 2 subjects (24%) as compared to those in Cohort 1 (28%). However, we are not reluctant to admit the fact that there was only one pseudo-C infant among the Cohort 2 sample, whereas 4 infants in Cohort 1 were classified as pseudo-C babies. This may be ascribed to the effect of the curtailment of the separation episodes. However, since the distribution across A, B, C types in the two independent samples were quite similar and the percentage of pseudo-C babies was very small, there is no reason to cast doubt on our findings in the replication study.

Our findings from the two cohorts indicate the possibility of a temperamental disposition toward irritability in neonatal period and fearfulness in the second half of the first year, that could make a considerable contribution to the attachment classification. At the same time, we feel that constitutional characteristics of the infant cannot fully account for the Strange Situation classification. It is not yet clear how temperamental factors like irritability and fearfulness influence the attachment classification. Temperamental and maternal variables are likely to interact in the course of the first year to determine the pattern of attachment behavior. As described earlier, our data on the effects of maternal intrusiveness on the attachment classification are not clear.

Analysis of our data on mother-infant interaction observations in the home at 4 and 7.5 months of age for Cohort 2 infants will permit more objective assessment of both the affective quality of the mothers' interaction with the infant, and the contingency of the

mothers' response to the infants signal (Kanaya, in this volume).

Lamb et al (1985) propose the following :

> To evaluate more complex models, future studies must be designed to assess infant characteristics both within and outside of interactive situations, beginning early in the first year, in order to better understand the child's contributions to interactive harmony. In longitudinal analyses, stability of infant characteristics and their changing influence on adult-infant interaction over the first year could be appraised. (P. 113)

Presently we are planning to test a third cohort of mother-infant pairs in Sapporo, a process that will enable us to obtain data relevant to the point Lamb et al have emphasized.

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MATERNAL AFFECTIVE EXPRESSION AND INFANT'S MOOD IN A LABORATORY SITUATION : A JAPANESE CASE

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The results of a Japanese replication of the vocalic social referencing experiment (conducted by Dr. Marilyn J. Svejda*, in Denver) were discussed in comparison with the original. It was argued that the failure to replicate was due to (1) different attitude of the Japanese mothers towards laboratory situations, resulted from relative unfamiliarity with such research and the Japanese attitude towards "the others" in general, (2) greater negative effects of separation from their mothers in the Japanese infants. Exploratory analysis suggested correlation between the style of maternal affective expression and the infant's mood in a laboratory situation. It was suggested that cross-cultural study of social interaction should look beyond the circumscribed context and consider the comparability of experimental factors in cultural-contextual perspective.

Key words : affective expression, cross-cultural study, emotional communication, laboratory situation, social referencing.

INTRODUCTION

One ultimate objective of cross-cultural mother-infant interaction study is to understand the mechanism involved in the development of the relationship. In recent years, a number of studies using Ainsworth's Strange Situation have improved our understanding of some aspects of the development of attachment in infancy (Bretherton and Waters, 1985 ; Lamb, Thompson, Gardner, and Charnov, 1985). While the Strange Situation serves as a standardized context for cross-cultural comparison, the interpretation of the results involves factors beyond the circumscribed context. Thus, for example, the large number of Type-A infants in Northern Germany was interpreted as related to the view that the value of independence was emphasized there ; or the prevalence of Type-C babies in Japan was said to be related to, among others, the absence of baby sitting by people out-side the household in Japan (Grossmann, Grossmann, Spangler, Suess and Unzner, 1985 ; Miyake, Chen and Campos, 1985). However, no effort has yet been made to systematically examine cultural and contextual factors directly related to inter-personal interaction patterns in the laboratory.

It is believed that observations of the behaviors of the mothers and their infants in similar, but not identical, situations will shed light on the current issue. In this paper, observations of the response of both the mothers and their 11 months old infants in an experimental situation will be reported. These observations will be discussed in compari-

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son with what are known to be the case in, for example, the United States.

Specifically, two issues will be discussed : (1) problems in cross-cultural replication of experiments involving mother-infant interaction, and (2) the relationship between maternal style of affective expression and infant's mood.

These discussions are based on observations resulting from our replication of the vocalic social referencing experiment, originally carried out in the Infant Studies Laboratory in Denver (Svejda, 1981). The replication itself proved to be a failure, for it did not generate much compatible data. However, an analysis of the procedures and the results reveals interesting facts about cultural and situational differences in the behavior of our subjects, both the mothers and their infants. These differences will be discussed from the point of view of cultural differences in response to strange situations in general, and to observation in a university laboratory situation in particular. Furthermore, a hypothesis concerning the relationship between maternal affective style and infant behavior characteristics will be suggested.

REPLICATION OF SOCIAL REFERENCING EXPERIMENT

In this paper only an outline of the orignal procedure will be given. For details, the readers are referred to Svejda (1981).

METHOD

Subjects

Thirty infants of 11 months and their mothers served as subjects. No attempt was made to control for birth order of the infants. The numbers of male and female infants were 14 and 16, respectively. The subjects were recruited with the assistance of the neonate section of a hospital in Sapporo. Contacts were made and consent was obtained by telephone using a list of infants born several months before. About three thousand Japanese Yen (c. 13 US Dollars) was paid to the subjects to cover transportation and small gifts. Upon arrival, the subjects were received in a separate room by two female assistants. The subject infant and, if accompanied, his/her siblings were entertained for about fifteen minutes before the mother left for another room to be trained to perform the experimental task. After the mother had reached the experimental criteria for performance, the infant was brought to the room by an assistant and the testing then began.

Porcedure

The behavior of the infants and their mothers was observed and recorded by VTR in the laboratory. Prior to the experiment proper, the mother alone was trained in a separate room away from the subject infant to perform one of three vocalic expressions (joy, anger and fear). Three trials were administered in which one of the three radio-controlled toys appeared and situated itself at the third point of an equi-lateral triangle including the mother and the infant. After the appearance of the toy had created some uncertainty and the infant had begun to approach the toy, the mother was signalled, through an ear-phone, to utter the assigned expression. The experimenter's target was the infant's response and the subsequent behaviors.

Since no discussion of these originally targeted measures will be attempted in this paper, no details will be given here. Readers interested in the vocalic social referencing

experiment itself can turn to Svejda (1981) or to Miyake, Campos and Kagan (1984) for a summary of results from a related study.

RESULTS

As has been mentioned, this replication proved to be a failure in the sense that it did not produce as much compatible data as was expected. The following analysis is from a view-point different from that of the original plan. It is believed that some lessons can be learned about cross-cultural replication of experiments in general, and cultural differences in mother-infant relationships and their responses to the laboratory situation.

In fifteen cases out of thirty, either the infant was too upset to be separated from the mother after entering into the laboratory or, having accomplished separation in the laboratory, the infant was too unstable to stay alone. Seven out of the remaining fifteen cases completed the first trial, but the infants were too upset to continue the experiment. Only four out of the last eight pairs managed to finish all three trials. Thus, the main cause for the failure was infant fussing and/or crying which forced the experiment to be terminated.

How about the performance level of the American subjects ? According to Svejda (1986), only a negligible number of Denver subject did not complete the experiment (8 out of 72) ; the number of subjects who could not begin the experiment because they could not be separated from their mothers was even smaller (1 out of 72). In fact, as this was not a problem in the original Svejda study, the issue was not even mentioned. Not until the replication was well underway did the issue became apparent to the researchers.

As will be recalled, the experimental procedure required that during the time when the mothers were being trained to utter an expression in one of the three affects, the infants had to be separated from the mothers so that the semantically meaningless utterance would not be heard by the infants. While this did not seem to have caused any major problem among Denver subjects, it was the main factor that led to the fussing and crying in the Japanese infants during the experiment. To the Japanese infants, the separation required by the procedure served as a stressful factor.

To further explore this hypothesis, five more mother-infant pairs were asked to visit the lab twice so that both the mothers and the infants had an additional chance to familiarize themselves with the assistants and the environment. However, observation reveals that the effect of separation was not removed by having two visits.

An additional stressor factor turned out to be the mothers' repsonse to the lab situation, especially to the task of producing affective expression by imitating a stranger. The frequent appearance of defense mechanisms aimed at reducing anxiety as was observed in many of them during the training session indicates the stressful nature of the situation. It is likely that in some cases the anxiety was in turn conveyed to the subject infants, perhaps inadvertently.

Although adequate evidence to confirm the above observation is not yet available, the following two considerations will help us in estimate the validity of this impression.

(1) Japanese mother-infant relationship. As compared with infants in the United States, for example, Japanese one-year-olds tend to respond to strange situations with fear, resulting in more proximity-seeking and/or maintaining, and more fussing and/or crying in

unfamiliar environments. This seems to be true, judging from several recent studies comparing Japanese infants with infants in other societies using the Ainsworth Strange Situation procedure (see Miyake et al., 1985 ; Lamb et al., 1985 ; Ujiie, 1986). The training session in the replication, in which the infant was separated from the mother for at least five minutes, and was attended to by a stranger, was a very demanding strange situation for the Sapporo subjects.

(2) The mothers' behavior in a laboratory situation. Again, as compared with what is understood to be the case in the United States, Japanese mothers tend to be tense and behave more anxiously in a lab situation. This has to be understood in view of the fact that the distance between the 'ordinary people' and 'the university' is still greater than the researchers are willing to admit. The physical environment of a university lab also works towards increasing this distance. The contrast is even greater in the case of the Denver laboratory, which is specially endowed with a relaxing, 'homy' atmosphere that is usually lacking in university laboratories.

Furthermore, an impression many Japanese researchers in mother-infant development will not fail to gain when visiting an American laboratory is the casualness with which the mothers behave. This can also be understood by referring to two unique Japanese concepts : (1) the concept of showing respect by physical and psychological tenseness and, (2) the uniqueness of the Japanese concept of the within/without, or private/public distinction (uchi/soto). It is not the intention of the author to argue whether the lack of casualness (that is, the tension observed in many Japanese mothers in a laboratory situation) is an expression of respect or not. Suffice it to say that at least it takes the Japanese mothers more time to relax and to behave more spontaneously in a laboratory situation.

Apart from these factors, relative infrequency of research involving behavioral observation of mothers and infants in a laboratory situation in Japan is another contributing factor. Unfamiliarity with similar occasions seems to make the Japanese mothers feel nervous when put into such a situation. That our subjects tend to consider the occasion as special can also be seen in the fact that they usually come to the laboratory with their 'Sunday best'.

In addition, if their infants fussed or cried during experiment, the Japanese mothers tend to feel obliged to take responsibility for it. And it was not unusual to find them apologize to the research assistants for "not being cooperative". This behavior of the mothers agrees with the common Japanese practice of the parent's assuming responsibility for their child's behavior.

Although more systematic and intensive observation will have to be conducted to enable us to make more precise and refined statements about the differences, the above impressions were also endorsed by some Western researchers.

MATERNAL AFFECTIVE STYLE AND INFANT MOOD IN A LABORATORY SITUATION

As one trial after another turned out to be either truncated or totally failed, we began to realize that some correlation seemed to exist between the degree of tenseness in the mother's behavior and the negative mood of the infant in the laboratory. Without changing the procedure for the subjects, it was decided that the training of the mothers

would be observed and recorded.

To further investigate the matter, the following indices were explored :

(a) Maternal variables : latency to imitative behavior, number of trials or total time needed until reaching performance criteria set by the trainer, number of 'defensive behavior' (e. g. unnatural giggling, laughing, covering of mouthnose area, shunning away from trainer, coughing, etc.), direction of gaze, naturalness of posture, voice, and relaxation in general.

(b) Infant variables : Presence of crying or extended fussing in separation, presence of crying or fussing upon entering observation room, ability in separating from the mother in observation room, presence or absence of spontaneous playing, number of trials completed, etc.

Preliminary analysis indicates that our hypothesis is supported and that further observation and analysis will be fruitful.

DISCUSSIONS

Emotional Communication in Long- and Short-Terms

By 11 months, an ordinary pair of mother and infant would have spent enough time together to develop a system of emotional communication. In a laboratory situation such as was mentioned above, concious or unconcious emission of signals or any other-than-usual signs from the mother (assuning the mother to be the more sensitive and the 'leader' of the two, and that the infant makes active use of emotional cues from the mother, as is propounded by social referencing theory), is likely to produce great effects on the infant, and indeed, on the dyadic interaction process. However, while positive correlation seems to be indicative of the operation of a sentive communicational system between the mother and the infant, negative correlation does not rule out the possibility of the operation of a secure and resilient system. The emotional communicational system and the system that operates in coping with stressful situation are to be clearly distinguished.

In view of the importance of temperamental disposition in early development, the possibility that the suggested correlation between maternal style of affective expression and infant's mood might have a biological base can not be ruled out. It has been shown that affective expressiveness is related to personality traits and physiological variables in pre-school children (cf. Buck, Miller and Caul, 1974 ; Buck, 1977). Further study of this issue in early infancy will not only enable us to clarify this point, but also shed light on the process of the development of mother-infant emotional communication.

Cross-Cultural Mother-Infant Interaction Study

In recent discussions of the validity of Ainsworth's Strange Situation as applied to infants in different societies, no systematic attempt has yet been paid to the issue of comparability of factors beyond the level of the standardized procedure. Thus, while the Strange Situation serves as a standardized procedure, the subjects' attitude towards being observed in a laboratory can differ in different societies ; the causes for the difference ranging from different familarity with such encounters to different interaction pattern between researchers and the subjects in different societies.

Judging from the fact that, regardless of whether we agree with the original

hypothesis in social referencing or not, the researcher's intention in replicating the experiment was to obtain as satisfactory a performance as could be obtained, it was impossible to argue that the replicating experiment was conducted without, or with inadequate, care. However, one possibility can not be ruled out : different perception of what constitutes "adequate" or "desirable" interaction pattern with the subjects might lead to different results. If this was the case, the difference or distortion will be a systematic one, and the eradication of it will require special efforts. In other words, if the researches are not guilty of being deliberately careless, the results we obtained high-light differences in perception or conceptualizaion on the part of the researchers involved, the understanding of which and the solution of problems arisen therefrom can be important for a better comprehension of the phenomenon under study.

Although we were forced into the consideration and the investigation of the issue, the accidental nature of the finding does not deminish its importance as a reminder to examine beyond what is given from the beginning and, to bring into light the foot of the searching light.

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IS THE STRANGE SITUATION TOO STRANGE FOR JAPANESE INFANTS ?

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A recent Sapporo study revealed that some cultural context peculiar to Japanese mothers and infants would constrain and reduce the validity of the Strange Situation procedure and the ABC typology for Japanese infants. Although this conclusion seemed to be supported by studies in West Germany and Israel, Sroufe criticized the validity and generality of the Sapporo study. He Claimed that there were theoretical and methodological problems in the Sapporo study. However, by comparing the data from the two other Japanesse studies, his criticism was refuted. In respect of the proportion of attachment types, the data from these two studies did not agree with that of the Sapporo study, (they were comparable to U. S. results), however, the observed or inferred behavior patterns in the strange situation were quite congruous with that of the Sapporo study.

Key words : Strange situation, Japanese infants, Attachment

Strange Situation procedure and the ABC typology developed by Ainsworth and Wittig (1969) are considered reliable and a valid measurement of the quality of mother-infant attachment in the United States. However, its applicability to non-American samples is not without problems (Lamb et al, 1984). In this article, the applicability of the Strange Situation procedure and the ABC typology for the Japanese infants will be discussed by examining data of studies in which the Strange Situation procedure with Japanese infants was performed.

FINDINGS OF THE SAPPORO STUDY AND ITS IMPLICATIONS

Recently, Miyake and his collaborators conducted the Strange Situation procedure with Japanese infants living in Sapporo. Miyake et al (1985) and Takahashi (in press) reported that there were more than 30% C's and no A's in their sample.. This results differ strikingly from those of the American samples, that is, there were 10%－20% C's and 20%－30% A's.

What does this difference mean ? Are there many resistant infants in Japan as compared to the U. S. ? Miyake et al (1985) answered this question by throwing doubt on the assumption of the ABC typology and applicability of the procedure to Japanese infants. Owing to the facts that Japanese mother and infant relationship is typically characterized by constantly close physical contact and by the infrequency of separation from the mother, and that the Japanese infants tend to have a temperamental disposition towards fearfulness and irritability, it can be expected that the Strange Situation will be too strange and too stressful for Japanese infants. Thus they did not consider the C type of response of the Japanese infants as a direct reflection of a greater tendency to be insecurely attached.

Their interpretation was supported by Ujiie & Miyake (1985) and Ujiie & Chen

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(1985). Ujiie & Miyake (1985) described Japanese infants' behavior patterns in the Strange Situation and made a comparison with Ainsworth's description on American infants. They found that Japanese infants tended to be extremely distressed throughout the strange situation. Even in Episode 2, they tended to activate attachment behaviors such as seeking proximity and contact with their mothers, and inhibit exploratory behaviors. These tendencies indicated that they seemed to experience disstrong stress even in the beginning of the procedure, because, according to the attachment theory of Bowlby (1969) and Ainsworth (Ainsworth et al, 1978), the attachment system was in general activated when infants experienced distress, while the explorative system was inhibited under stress. In the case of U. S. samples, most infants actively explored the unfamiliar situation, and did not activate an attachment system in Episode 2. This fact seems to suggest that the psychological meaning of Strange Situation differs even at Episode 1.

Moreover, Ujiie & Chen (1985) reported that the level of distress in the preseparation periods could predict the Subsequent pattern of attachment behaviors. They divided their sample into two subgroups depending on the level of distress in the preseparation period : 19 negative infants (NI) and 37 less negative infants (LNI). They reported that NI's tended to be entirely distressed in the infant-alone-session and display some resistance toward their mothers in Episode 8, thus they tended to be classified as C or B4. However, for these infants, the stress experienced in the separation episodes, particularly in the infant alone session, was perhaps too intense to be soothed easily by a reunion with their mothers, because they have already experienced stress even at the beginning of the procedure and a relatively great amount of distress during the first separation from their mothers as shown in figure. 1. At least for these infants, the procedures created a distress so intense that its effects were qualitatively different from that which was originally designed by Ainsworth (Ainsworth et al, 1978) in the Baltimore sample. Thus it can be speculated that the resistant behaviors displayed by these infants would reflect not insecurity of attachment or maladaptive parent-infant relationships but rather an unusual and

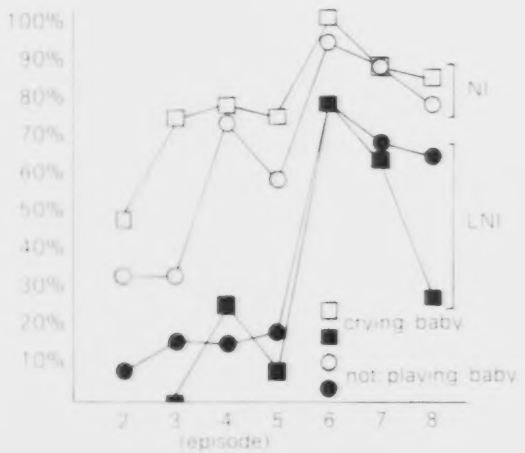

FIGURE 1 Pattern of Affective States

temporary responses to the additional stress caused by the strangeness of this procedure itself.

Therefore the results of the Sapporo study imply that Japanese child rearing practice and infants' temperamental dispositions should reduce the appropriateness of the Strange Situation procedure in Japan, and as a result, these factors constrain the validity and appilicability of ABC typology in Japan.

OTHER CROSS-NATIONAL DATA SUGGESTED TO SUPPORT RESULTS AND INTERPRETATIONS OF SAPPORO STUDY

Some recent studies on the patterns of attachment with non-American samples, similar to the Sapporo study found a different proportion of attachment types from U. S. samples. Grossmann et al (1981) found a very high proportion of A's in the West German (Bielefeld) sample, and Sagi et al (1985) found a high proportion of C's in the Israelite kibbutz sample. In West Germany, there were 49% A's and 12% C's. B's were only 33% of their sample. On the other hand, there were 34% C's and only 8% A's in the kibbutz sample. Fifty-six percent of their sample were classified as B's.

Grossmann and his coresearchers interpreted avoidant behaviors displayed by infants to reflect not insecurity of attachment or maladaptive parent-infant relationships but the desired outcome of cultural values and conscious parental strateiges (Grossmann & Grossmann, 1982 ; Grossmann et al, 1985). In the area of Northern Germany, the ideal is an independent, nonclinging infant who does not make demands on parents. Most North German mothers feel that they should be weaned from close bodily contact as soon as the infants become mobile.

On the other hand, Sagi et al (1985) pointed out the importance of infant characteristics in the kibbutz sample as was the case in the Japanese sample. According to Sagi et al (1985), one third of the Strange Situation procedure had to be modified or terminated because the infants were intensely and inconsolably distressed. Once they were distressed, neither the stranger's departure nor the attachment figure's ministrations were successful in calming the infants. Most of the infants whose assessment were terminated or modified were later rated as resistantly attached. Thus the procedures created a psychological state of distress so intense for these infants that its effects were qualitatively different from those typically observed in U. S. samples.

In summary, the results of the Sapporo sample, the Bielfeld sample and the kibbutz sample clearly indicate that the psychological meaning of behaviors observed in the strange situation depends on the cultural context such as child rearing customs or social value system as well as the appropriateness of the procedure. Sagi et al (1985) and Ujiie & Chen (1985) suggested that the Strange Situation procedure and the ABC typology would not be a fair test of security of attachment in either the Kibbutz or Japanese sample.

SROUFE'S CRITICISM ON THE DATA AND INTERPRETATION OF CROSS-NATIONAL STUDIES

However, Sroufe (1985) questioned the validity and generalizability of these results and interpretations, especially those of the Sapporo study, because they were interpreted by Campos et al (1983) as evidence to support Kagan's (1982) position that strange situation

classifications reflect temperament.

Sroufe (1985) raised three problems. Firstly he pointed out that the problem of temperamental features of Japanese infants are still controversial. Miyake and his collaborators expected that Japanese infants have a temperamental disposition towards fearfulness, or tendency towards inhibition and crying in accordance to findings of Kagan et al (1978) about Oriental infants. However, Freedman (1974) reported that Oriental newborns were less changeable, less perturbable, and tended to calm themselves or be consoled more readily when upset. This description clearly contradicts the expectation of Miyake and his collaborators that Japanese infants have a temperamental disposition towards fearfulness, inhibition and crying.

Secondly, Sroufe pointed out a procedural problem of the Sapporo study. In the Sapporo study, investigators allowed the separations to go on for 3-min. regardless of the amount of infants' distress, rather than cutting the separation short, as is done in the U. S.

Thirdly, Sroufe pointed out the problem of sampling. In the case of Germany as well as in Japan, the proportion of attachment types which were obtained from non-traditional modern samples were comparable to U. S. samples. In fact, the study of Durrett et al (1984), which was done with "a modern Japanese sample", reported that the proportion of A's was 13% and C's was 18%. A study with Chinese Americans revealed a link between C status and the degree of acculturation (Li-Repac, 1982 cited in Sroufe, 1985). Thus Sroufe insisted that the result and interpretation of the Sapporo study and also of Grossmann's study should be applicable to only one particular sample, those who are reared by "traditional mothers".

Thus Sroufe (1985) claimed that the validity, findings and conclusion of the Hokkaido study were questionable.

REFUTATION TO SROUFE'S CRITICISM ON THE SAPPORO STUDY

However, some of Sroufe's discussion points are refutable. At first, the procedural problem can be checked by comparing the results of two cohorts in the Sapporo study. Indeed, as pointed out by Sroufe himself, researchers allowed the separations to go on for 3-min in most cases regardless of the amount of distress in Cohort 1. But, in Cohort 2, researchers cut the separations short according to the amount of distress, as is done in U. S. Nevertheless the result of Cohort 2 was comparable to that of Cohort 1 (table 1). Moreover, in Cohort 1 as well as Cohort 2, many of children displayed distress even in the presparation periods (Ujiie & Miyake, 1985) and the degree of distress in preseparation period was found to be related to later classification of attachment. Thus, the distress experienced by the infants was not solely caused by the individual being alone as insisted by Takahashi (in press) but caused by the Strange Situation procedure itself.

Secondly, the criticisms of Sroufe (1985) can be refuted by detailed examination of the data of studies which employed the Strange Situation procedure with Japanese infants. Three studies can be referred to for supportivre evidence, the Sapporo study, the study of Durrett et al (1984) and the study of Hanta et al (1983).

The proportions of ABC types reported in these studies are shown in table 1. As shown in table 1, both findings of Durrett et al (1984) and Hanta et al (1983) were clearly diffement from the finding of the Sapporo study, and they were rather comparable to the

TABLE 1

Proportions of Attachment Types in Different Countries

	Ainsworth et al 1978 (N=106)	Grossmann et al 1981 (N=49)[a]	Sagi et al 1985 (N=83)[b]	Miyake 1986 Cohort 1 (N=29)	Cohort 2 (N=30)	Durret et al 1984 (N=39)[c]	Hanta et al 1983 (N=24)[c]
A	22(21%)	24(49%)	7(8%)	0	0	5(13%)	2(8%)
B_{1-3}	66(62%)	15(31%)	40(48%)	17(59%)	19(63%)	13(33%)	19(79%)
B_4	5(5%)	1(2%)	7(8%)	1(3%)	3(10%)	11(28%)	
C	13(12%)	6(12%)	28(34%)	11(38%)	8(27%)	7(18%)	3(13%)
Unclassified		3(6%)	1(1%)			3(8%)	

a Subjects were West German middle-class.
b Subjects were Israel kibbtznik.
c Subjects were Japanese middle-class.

findings of the American samples : A's were 13% and C's were 18% in Durrett et al (1984), and A's were 8% and C's were 13% in Hanta et al (1983), whereas C's were 30% and A's were not found in the Sapporo study (Ujiie & Chen, 1985).

However, it is insufficient for the purpose of this article to compare solely the proportion of ABC types. Examining the data reported by Durrett et al (1984) and Hanta et al (1983) in detail, a different feature of Japanese infants in the Strange Situation is revealed, contrary to the feature revealed by the proportion of ABC type reported by themselves.

Findings of Durrett et al (1984)

At first, the data of Durrett et al (1984) was examined. Durrett et al (1984) reported that 62% of their sample were classified as B's, but about a half of the B's were B4. They treated B4's as securely attached infants in accordance with Ainsworth et al (1978). However, in their studies with Israel samples, Sagi et al (1985) did not treat the B4 as showing a secure attachment. They distinguished the B4 from other B's and called it "dependent" attachment type. They combined it with group A and C because of their anxious behavior patterns in the strange situation. Moreover, even in Ainsworth et al (1978), the distinction between B4 and C's is ambiguous. They described the B4 infant as follows :

> He seems wholely preoccupied with his mother throughout the strange situation. He gives the impression of feeling anxious throughout, with much crying. In the second separation, particularly, he seems entirely distressed.··· He may show some resistance to his mother, and indeed he may avoid her by drawing back from her or averting his face when held by her. Because he also shows strong contact-seeking behavior, the impression is of some ambivalence, although not as is shown by Group-C infants (p. 62).

Thus, it is possible to infer that 28% of their sample, who were classified as B4, behaved anxiously throughout the strange situation and displayed some ambivalence in the reunion with their mother, even though they were classified as B's. Moreover, according to the manner of analysis employed by Sagi et al (1985), since 18% of their sample were classified as C's, their data imply that 46% of their sample displayed strong distress and some ambivalence in the strange situation. This finding does not support at all the discussion of Sroufe (1985), which expressed doubt about the generality of findings and the

conclusion of the Sapporo study. Durret's study indicates more definitely than the Sapporo study that the strange situation is too stressful for many Japanese infants, even though they are from non-traditional "modern" families.

Findings of Hanta et al (1983)

Secondly, the data of Hanta et al (1983) was examined. Hanta et al (1983) reported that only 13% of their sample were classified as C, and about 80% of their sample were classified as B. The proportion of B's is very high compared with American samples and other Japanese samples. However, their data about the proportion of attachment types are inconsistent with their descriptions regarding attachment behaviors. They reported that 33% of their sample showed moderate (4-5) to strong (6-7) resistance to their mother in Episode 8. Resistance to the mother in Episode 8 is conspicuous characteristics of the C baby in general. This result indicates that more than 30% of their sample were very anxious and ambivalent in the strange situation. Therefore the result of this study seems to support Miyake et al (1985) and Ujiie & Chen (1985), although the proportion of attachment types is different.

They also reported the descriptive data about descrete behaviors in the strange situation. According to their description, many of their samples activated an attachment system rather than an explorative system in Episode 2. Only 50% began to approach toys within 1 minute, and even after beginning to play with toys, many infants sometimes approached their mothers to gain assurance of security in the strange situation. Moreover, the mean frequency of crying in the infant-alone-session was higher than that reportedin Ainsworth et al (1978), and even after reunion with their mothers, the mean frequency of crying did not decline to the level of that in Episode 5. More than 50% of their subjects were not easily soothed by bodily contact of their mothers in Episode 8. These results are very similar to those of Ujiie and Miyake (1985), and also indicate that the strange situation should create extreme distress in Japanese infants.

CONCLUSION

The data from these two studies revealed that there was a high proportion of anxious and resistant infants, in spite of their strange situation classifications. That is, more than 30% of their subjects were anxious and completely distressed, and even displayed some ambivalence in the strange situation. Thus, these results clearly indicate that Sroufe's (1985) criticsms about procedural and sampling problems of Sapporo study have no validity.

Moreover, Hanta et al (1983) reported that many of their samples displayed some signs of distress even in Episode 2, and also a degree of distress raised by the infant alone session did not easily decrease in the reunion with their mother. These results seemed to indicate that the Strange Situation created a distress so intense in some infants that they could not easily recover from the distress even by reunion with their mothers. Thus, these findings imply a contribution from intants' temperamental characteristics is involved and therefore can not be neglected.

From the above, it can be concluded that the results and discussion of the Sapporo study has validity and generalizability for Japanese infants.

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THE RELATION BETWEEN MOTHER-INFANT INTERACTIONAL CHARACTERISTICS IN EARLY INFANCY AND LATER ATTACHMENT AS ASSESSED IN THE STRANGE SITUATION

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Maternal and infant interactional characteristics in early infancy were investigated in order to examine the causal relationship with later attachment as assessed in the Strange Situation. Although the results of rating for maternal variables at 4 months of age exhibited significant differences between B_1, B_3 and B_4 & C, no significant differences were discovered between B and C. As for infant variables, only negative reactions to the stranger showed significant differences between B_1-B_3 and B_4 & C. Individual differences in this temperament related reactions were also found between B and C.

After analyzing "meshing" between mother and infant, several "meshing" patterns were discovered. With B_1-B_3 mothers and infants very good "meshing" was exhibited, whereas B_4 & C mothers and infants tended to show "out of tune" patterns because of either mother's inadequacy in interacting with her infant (e. g. B_4 mothers) or the infant's negative affect and behavior (e. g. C infants). These results suggest that later attachment as assessed in the Strange Situation may be determined not by maternal variables but by "meshing" or "compensative function in each partner". Infant temperamental disposition especially may function during interaction with the mother, and the temperamental tendency becomes apparent in a critical or stressful situation.

Key words : maternal sensitivity, infant reaction to a stranger, attachment classification, meshing between mother and infant.

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INTRODUCTION

Previous investigations have studied maternal sensitivity as determining the infant's behavior in the Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978). Few investigations however have dealt with infant factors such as temperament which explain their behavior in the Strange Situation. Miyake, Chen, and Campos (1985) discussed Japanese mother-infant attachment relationships from this point of view. Ujiie and Miyake (1985) explored Japanese infants' crying response in each episode of the Strange Situation. Furthermore only a few studies have dealt with the relation between mother-infant interaction in early infancy and later attachment. Belsky, Rovin, and Taylor (1984) investigated maternal behavior in the first year and later attachment relationships. Lamb, Thompson, Gardner, Charnov, and Estes (1984) discussed security of infantile attachment as assessed in the Strange Situation. They interpreted infantile attachment from a biological point of view. Lamb, Thompson, Gardner, and Charnov (1985) thoroughly reviewed the origins and developmental significance of individual differences in strange situation behavior. They explained and discussed, in one chapter, the major longitudinal studies which have explored antecedents and consequences of mother-infant attachment relationships. Opinion is devided on antecedents and many results have not been confirmed yet. Therefore, the purpose of this paper is to examine antecedents of mother-infant attachment as assessed in the Strange Situation. The following points will be examined and argued in this paper. (1) Whether maternal sensitivity to infant distress in early infancy is related to later "quality" of attachment as Ainsworth insists, (2) What maternal variables other than sensitivity influence the developmental course of attachment, (3) How mother's mode of interaction and infant temperamental disposition in early infancy are related to later attachment.

METHOD

Subjects

The sample consisted of 29 middle-class mothers and their first-born infants. Twenty-three infants (16 boys and 7 girls) were followed from birth, and the other six (2 boys and 4 girls) from the age of 4 months. They were participants in a longitudinal study of infant's social-emotional development.

Procedure 1 : Home observation of mother-infant interaction at 4 months of age

Mother-infant daily interaction was observed and video-tape recorded by two observers at the subject's home. The observation and video-tape recording were temporarily suspended when the infant fell asleep and resumed after he (she) awoke. Each mother was instructed to behave as usual and to try to reduce their anxiety about being observed. The two observers sat at a corner of the room and made every effort not to interfere with the mother and infant's ongoing flow of behavior. The observation and recording covered both the morning and the afternoon hours. The video camera was situated at one corner of the room so as not to attract attention. A timer image indicated the real time. Total length of recording for each subject both in the morning and in the afternoon was about 90 minutes.

(1) Measurements of infant negative affect and behavior and mother's mode of interaction

Using timer indications on the screen by playing back video tapes, two coders coded frequencies and durations of infant negative episodes which included negative vocalization, fuss, cry and physical movement such as squirming, kicking, and so on. Mother's response time to those episodes was also recorded. With regard to infant's negative episodes, frequency, duration, and latency measures were obtained through this coding.

(2) Rating for maternal variables and infant variables

Two well trained raters independently rated both the maternal and the infant variables from the video tapes. They were blind to not only the purpose of this study but also the results concerning this project. Rating items used were selected from 'Rating Scales of Mother-Child Interaction' developed by Roseanne Clark et al (1980). After sufficient training and discussion so as to get an assessment based on behavior, seven items for maternal variables and two for infant were chosen.

(i) Explanations of maternal variables

Numbers at the beginning of an each explanation are the original ones in Clark's scales (Reference Note).

(9) Amount of expressed positive affect
Toward child (e. g., touch, smile, affection, hugs, enthusiasm).

1. None.
2. Slight positive affect (one or two times for a brief period).
3. Some positive affect (three or four times for a brief period).
4. Moderate positive affect expressed (five or more times for a longer period than in # 3). Not frequently or characteristically.
5. Considerable positive affect expressed frequently, easily and characteristically.

(11) Mother's involvement with child-connectedness
Engagement ; in tune with.

1. No involvement, distant ; totally unaware ; rarely even looks at child ; unconnected.
2. Very little involvement ; makes only brief, fleeting periods of contact ; this may also manifested by "going through the motions"; quality of interaction.
3. Moderate but sporadic or less intense involvement, involved some of time.
4. Considerable but not characteristic involvement. Brief, fleeting periods of uninvolvement.
5. Very involved ; engaged ; connected ; in tune with child.

(12) Mother's intrusiveness
This variable evaluates the mother's intrusiveness and focusses on her interferance and domination of her child. This includes overstructuring, overcontrolling, interfering, etc., so that the child's initiative is often thwarted.

1. Very intrusive ; domineering.
2. Frequently intrusive (one or two instances of respect for child's initiation).
3. Moderately intrusive.
4. Slight intrusive behavior (one or two brief instances).
5. Not at all intrusive ; may or may not include respecting child's autonomy.

(15) Spontaneous, Creative

Initiating novel interactions with child ; may include following child, extending and elaborating child's initiation.

Raters may infer mother's ingenuity and resourcefulness.

1. Not creative.
3. Some indication of creativity ; ingenuity ; resourcefulness.
5. Very creative ; original ; resourceful.

(22) Mother reads child's cues and responds sensitively and appropriately. This variable is composed of mother's ability to accurately observe her child's cues, to understand what the child's needs and wants (empathize) and demonstrates the capacity to respond appropriately to the child needs. This may also include comforting and soothing a child when he is distressed.

1. Insensitive to child ; oblivious to child's cues ; consistently misreads or misinterpretes child's cues.
2. Basically insensitive and/or oblivious to child's cues.
3. Demonstrates some capacity to read child's cues and to respond somewhat appropriately.
4. Reads child's cues and responds appropriately and sensitively most of the time.
5. Very empathic; characteristically reads child's cues and responds sensitively and appropriately.

(24) Mirroring

This variable measures the behavioral indicators of the mother's emotional availability to the child. It can be seen in the mother's reflection of the child's affect and/or behavior through imitation, echoing, (with infants), gazing, smiling, confirming behavior, approval, encouragement, and praise.

1. No evdience of mirroring.
2. Slight evidence (one or two instances of minimal intensity).
3. Some evidence of mirroring.
4. Considerable number of instances.
5. Optimal mirroring characteristic.

(25) Structures and mediates environment

This variable attempts to assess the mother as the child's first or auxiliary ego, i., e., a mother's demonstrated capacity to take the role of an adult caretaker as appropriate to her child's needs. This can include modulating affect and stimulation, and structuring the interaction between them and limit setting. This can be measured by looking at how much she gains, helps to focus, and sustains attention to the relevant aspects of the situation. With young infant, this is manifested by good caretaking.

1. No instances of providing structure or mediation of environment.
2. A few attempts to structure/mediate.
3. Moderate amount of structuring/mediating.
4. On most occasions takes role of adult caretaker where this is appropriate.
5. Characteristically takes role of adult caretaker.

(ii) *Explanations of infant variables*

㊳ Irritability

Irritable ; tense ; moody ; fussy. May include difficult to care for, difficult to soothe. Raters should keep in mind frequency, intensity and duration.

1. Extremely irritable.
2. Generally, but not exclusively irritable.
3. Moderately irritable.
4. Slightly irritable.
5. No irritability.

㊴ Pleasant, cheerful, easy-going

1. Not at all.
2. Slightly pleasant, cheerful, easy-going (brief periods of cheerfulness).
3. Moderately cheerful ; somewhat pleasant or easy-going.
4. Usually pleasant, cheerful, and easy-going. Not characteristic.
5. Characteristically pleasant, cheerful, or easy-going.

Interrater agreements for both maternal and infant's variables ranged from 80% to 100%. With regard to disagreements over 2 points, final decision was made after thorough examination and discussion among the raters.

Procedure 2 : Measurement of infant reaction to a stranger at 4 months of age

In order to evaluate individual differences in infant reaction to a stranger, a strange situation paradigm was carried out in each infant's home before the observation of mother-infant interaction at 4 months of age. Table 1 indicates summary of the strange situation. Infant sat leaning back in a baby's reclining seat during this procedure.

Infant behavior to a stranger was rated using the revision by the author of sociability assessment scales by Lamb (1982) which were devised in order to assess infant's reaction to an initial encounter with an unfamiliar female adult stranger with particular attention to the components of wariness and affiliation which characterized the baby's responses to the stranger's social bids. The revised rating scores for infant's reaction to a stranger's

TABLE 1

Summary of Strange Situation at 4 Months

Episode	Person Present	Duration(Min.)	Brief Description of Action
1	M, I	2	Mother interacts with infant sitting by him (her).
2	M, I, S	1	Stranger enters and sits by the infant just looking at him (her).
3	M, I, S	1	Stranger calls infant's name and begins interaction (playing peek-a-boo).
4	M, I, S	1	Stranger touches infant's hands or feet.
5	I, S	1	Mother leaves the room. Stranger interacts with the infant.
6	M, I, S	1	Mother comes back and begins to play with the infant.
7	M, I	1	Stranger leaves the room. Mother turns her back without any response to infant initiation.

M : Mother I : Infant S : Stranger

initiation were as follows ;

1. Crying, fussing or other indications of distress.
2. Refusal to join by turning toward mother or another toy, turning away from the stranger, or just looking at stranger.
3. Initially reluctant, then participates.
4. Immediately joins in and participates with stranger.
5. Actively participates in interaction with stranger by smiling.

Interrater agreement ranged from 91% to 94%.

Procedure 3 : Attachment classification according to behavior in the Strange Situation at 12 months of age

The original Ainsworth Strange Situation procedure was used to assess mother-infant attachment relationship at 12 months. The details of this procedure were previously described (Miyake et al, 1983).

Using the original interactional coding system (Ainsworth et al, 1978), two well trained Japanese raters independently assessed strange situation behavior for all subjects. In addition an American rater also independently rated all the subjects. Interrater agreement regarding 6 categories (Proximity-seeking, Contact-maintaining, Resistance, Avoidance, Distance Interaction, and Searching) were sufficiently high. If one point difference was permitted, the percentage agreement ranged from 79% to 98%. Some cases were difficult to classify because their behavior patterns did not fit the original classification standards. Although these cases are open to further discussion, their classification by an American specialist was finally adopted.

Twenty-one subjects out of 29 were classified as B type and 8 were C type. According to the original rating system, subgroups were also determined, that is 17 were B_1 to B_3, 4 were B_4, 4 were C_1, 3 were C_2 and 1 was Pseudo-C which was not included in the original subclassification. In this paper, the subjects were divided into two groups ($B_1 - B_3$ vs B_4 & C). However the data from total B ($B_1 - B_4$) and total C (PC was included) were also analyzed.

RESULTS AND DISCUSSION

1. Comparison of infant's negative affect and behavior and mother's mode of interaction at 4 months and later attachment classification

Infant frequency of negative episodes (IFN), infant mean duration of negative episodes (IMD), infant longest duration of negative episode (ILD), mother's frequency of unresponsiveness of infant negative episodes (MFU), and mother's mean latency to respond to infant negative episodes (MML) were all calculated from the transciption of video tapes. Infant frequency of fussing and crying was transformed into the proportion of total observation units, by using the live coding data.

The mean, and standard deviation or the range for each measure are shown in table 2. No measures revealed any significant differences between B_1-B_3 and B_4 & C by Mann-Whitney U-Test. When B_4 was combined with the B_1-B_3 group, no significant differences between B and C were discovered. The antecedents for future B and future C were not revealed in these measures because there was a wide range in each measure regardless of the attachment classifications.

TABLE 2

Infant Negative Episode and Mother's Mode of Interaction

		B_1-B_3	B_4 & C
Infant Frequency of Negative Episode (IFN)	M.	25.6	28.8
	(SD)	(18.6)	(17.6)
Infant Mean Duration of Negative Episode (IMD)	Range	4.6	6.7
	sec.	35.8	40.6
Infant Longest Duration of Negative Episode (ILD)	M.	94.4	127.2
	(SD)	(84.3)	(86.2)
Infant Fuss / Cry-Proportion of Total Observation Units (F/C)	M.	16.5	18.4
	(SD)	(11.3)	(12.3)
Mother Frequency of Unresponsiveness to Infant Negative Episode (MFU)	M.	3.6	7.3
	(SD)	(3.8)	(10.1)
Mother Mean Latency to Respond Infant Negative Episode (MML)	Range	1.0	1.3
	sec.	13.8	23.4

2. Relation between infant negative episodes and mother's mode of interaction

The interrelations between infant negative episodes and mother's mode of interaction to infant negative episodes within attachment classifications were analyzed (Table 3). As for IFN vs MFU, IMD vs ILD, IMD vs MML, ILD vs MFU, and F/C vs MFU, siginificant positive correlations were found in both attachment groups. High frequencies of infant negative episodes and fuss/cry were positively related to high frequency of mother's unresponsivity. Mother's prompt response was positively related to infant's short duration of negative episodes. With regard to IFN vs ILD, ILD vs MML, MFU vs MML, F/C vs MML, a different tendency was exhibited in each attachment group. With B_1-B_3, infant negative episode was significantly related to his (her) longest duration of negative episode but infant longest duration of negative episode and the proportion of fuss/cry were not significantly related to mother's prompt response. On the other hand the reverse tendency was noted in B_4 & C. Infant's longest duration of negative episode and his (her) proportion of fuss/cry were significantly related to mother's prompt response.

After B_4 was added to B_1-B_3, few differences from the correlations shown in table 3 were found within the B group and C group except for IMD vs MML of C group which showed no significant correlation. In C group infants mean duration of negative episodes and their mother's promptness of response were not significantly related to each other. In other words, their duration of negative affect and behavior are related to various aspects of mother's mode of interaction other than promptness or it is related to their own temperamental disposition.

No significant correlations were found for IFN vs MML, and IMD vs MFI in both groups. These results suggest that mothers usually responded to infant distress, although they varied in responding style. Some mothers were prompt to respond to their infant distress and others were very slow. Seventy-five percent of B_4 mothers were slow

TABLE 3

Correlations among Infant and Mother Measures (4 Months) Broken down by Later Attachment Classification

	B_1-B_3 (N=17)	B_4 & C (N=12)
IFN vs IMD	0.1466	−0.0726
IFN vs ILD	0.6160*	0.1708
IFN vs MFU	0.3206*	0.5387*
IFN vs MML	−0.2240	0.1660
IMD vs ILD	0.4571s	0.7999**
IMD vs MFU	0.0783	0.2509
IMD vs MML	0.5838**	0.7766**
ILD vs MFU	0.4855**	0.6124**
ILD vs MML	−0.0055**	0.7334**
MFI vs MML	0.0267	0.5396s
F/C vs MFU	0.5417*	0.6436**
F/C vs MML	−0.1802	0.7047**

** $p<0.01$ * $p<0.05$ s $p<0.1$

Each abbreviation is the same one as shown in TABLE 2

responders (9.8−22.4 second delay), while 85.7 percent of C mothers were not slow responders (1.3−6.5 second delay).

On the relationship between the two maternal measures (MFU vs MML), a significant positive correlation was discovered only in B_4 & C. Mothers who showed a higher frequency of unresponsiveness also exhibited a longer lasted period for responding, while B_1-B_3 mothers varied in unresponsiveness and promptness.

Summarizing the results from tables 1 and 2, some relations between infant negative affect behavior and mother's unresponsiveness and promptness were revealed in both attachment groups. Therefore maternal unresponsiveness and prompt response in early infancy were not the only decisive factors for later attachment assessed in the Strange Situation in Japan (Bell, S. M. & Ainsworth, M. D. S. 1972).

3. Rating for maternal variables at the age of 4 months and later attachment classification

Table 4 indicates the distribution of rating scores for maternal variables at the age of 4 months by attachment classifications. Rating scores were divided into three grades, 1−2.5 (low), 3 (average), 3.5−5 (high). Comparing the two attachment groups, significant differences were found on 5 variables (Structuring, Unintrusive, Involvement, Mirroring, and Positive affect). On 2 variables (Spontaneous and Sensitive), differences between the two attachment groups were a little short of significant level. In general the distribution for B_1-B_3 inclined toward the higher rating scores, whereas the mothers of B_4 & C had a distribution which tended to lean toward lower scores. However these different tendencies between the B_1-B_3 and B_4 & C were not exhibited between the total B group and C group. Therefore the differences between B_1-B_3 and B_4 & C were caused by the results of B_4 mothers. Not all the C mothers were rated very low. Judging from these results the "quality" of later mother-infant attachment relationship assessed in the Strange Situation

TABLE 4

Distribution of Rating Scores for Maternal Variables (4 Months) by Later Attachment Classification

Variables	Attachment Classication	Rating Scores			χ^2	p
		1-2.5	3	3.5-5		
Structure	B_1-B_3	1	8	8	6.284	0.05
	B_4 & C	5	5	2		
Spontaneous	B_1-B_3	3	5	9	4.850	0.1
	B_4 & C	6	4	2		
Unintrusive	B_1-B_3	1	7	9	8.227	0.025
	B_4 & C	6	4	2		
Involvement	B_1-B_3	0	5	12	6.720	0.05
	B_4 & C	4	3	5		
Mirroring	B_1-B_3	0	4	13	8.778	0.025
	B_4 & C	5	1	6		
Sensitive	B_1-B_3	1	3	13	6.631	0.1
	B_4 & C	4	3	5		
Positive Affect	B_1-B_3	0	2	15	7.290	0.05
	B_4 & C	4	2	6		

was not determined by simply maternal "sensitivity" in early infancy (Ainsworth et al., 1978). Other aspects of maternal variables such as unintrusiveness, genuine involvement, structuring and mediating environment, mirroring or positive affect have a cumulative effect on infant social-emotional development and indirectly influence infant's strange situation behavior.

4. Comparison of infant variables (4 months) by later attachment classification

To investigate infant's affective and behavioral differences in early infancy, three kinds of data measured in different procedures were analyzed. As for the proportion of Fuss/Cry from live coding data and the rating scores of temperamental disposition (Pleasant-Irritable) from video tapes, no significant differences were found between the two groups. However only negative reactions to a stranger (NR to ST) showed significant differences between B_1-B_3 and B_4 & C. Namely, 13 out of 16 B_1-B_3 infants (81.3%) were evaluated as expressing low NR to ST, whereas 7 out of 11 B4 & C (63.6%) were rated as expressing high NR to ST ($\chi^2=3.872$, df = 1, $p<0.05$). When B_4 infants were added to B_1-B_3 group, the same differences were suggested between B and C. That is, 14 out of 19 B infants (73.7%) expressed low NR to ST, 5 out of 8 C infants (62.5%) expressed high NR to ST ($\chi^2=3.694$, df = 1 $p<0.1$). This result suggests that infant temperamental aspects were not manifested in a mildly stressful or stressless situation like a home environment, but were clearly manifested in the face of strangeness. The infant must cope with strangeness by his (her) own coping method. Some infants would behave as usual and others would withdraw from the strangeness. Infants classified as C at 12 months had a tendency to show negative or indifferent reactions to the stranger and withdrew from her at 4 months, while many B infants were not very agitated by the stranger and showed

positive or sociable reactions. However the finding that some B infants showed negative reactions and some C infants showed positive ones indicate there may be other factors involved which determine later attachment.

5. "Meshing" between mother and infant

Figures 1 and 2 illustrate "meshing" between mother and infant. The asterisk "*" represents the positive results and the slash "/" represents the negative results for maternal and infant variables. One pair from B_1-B_3 group and one from B_4 & C were

	1	1	2	1	1	1	2	2	1	1	1	2	2	1	1	1
(MOTHER)	0	1	0	1	0	0	0	0	2	0	0	0	0	2	1	0
(B_1-B_3)	2	7	2	3	7	4	1	5	0	8	9	8	3	1	1	5
Structure	/	/	/	/	/	*	*	*	/	/	*	*	*	*	*	*
Spontaneous	/	/	/	/	/	*	/	/	*	*	*	*	*	*	*	*
Unintrusive	/	/	*	*	*	/	/	/	*	/	/	*	*	*	*	*
Involvement	/	/	*	*	*	*	/	*	/	*	*	*	*	*	*	*
Mirroring	/	/	*	/	*	*	*	/	*	*	*	*	*	*	*	*
Sensitive	/	/	*	*	*	*	*	*	/	*	*	*	*	*	*	*
Positive affect	/	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
(INFANT)																
(B_1-B_3)																
Fuss / Cry	*	/	/	*	*	*	*	*	*	*	*	/	*	*	*	*
Pleasant	*	*	/	*	*	*	*	*	*	*	*	*	/	*	*	*
Irritable	*	*	/	*	*	*	*	*	*	*	*	/	*	*	*	*
NR to ST	*	*	*	/	/	/	*	*	*	*	*	*	*	*	*	*

FIGURE 1 Illustration of "Meshing" between Mother and Infant. "*" represents higher rating scores (4,5), "/" represents lower ones (3,2,1) for all the maternal variables and for three infant variables (Pleasant, Irritable, and NR to ST).
"*" represents lower Fuss / Cry, "/" represents higher Fuss / Cry.
The vertical numbers of 3 figures indicate the IdentificationNumbers for the subjects.

				B_4				B_4	B_4		≠	≠
	2	2	1	2	2	2	1	1	1	2	1	
(MOTHER)	1	0	0	0	1	1	1	1	1	0	1	
(B_4 & C)	1	6	6	4	4	2	5	0	6	7	4	
Structure	*	/	/	/	/	/	/	/	*	/	/	
Spontaneous	/	/	/	/	/	/	/	/	/	/	*	
Unintrusive	/	*	/	/	/	/	/	/	*	/	/	
Involvement	*	/	/	/	/	/	/	*	*	*	*	
Mirroring	*	/	/	/	/	/	*	*	*	*	*	
Sensitive	*	*	/	/	/	/	/	*	*	*	*	
Positive affect	*	/	/	/	*	/	/	*	*	*	*	
(INFANT)												
(B_4 & C)												
Fuss / Cry	/	/	/	/	*	*	/	*	*	*	*	
Pleasant	/	/	/	*	*	*	*	*	*	*	*	
Irritable	/	/	/	/	*	*	*	*	*	*	*	
NR to ST	/	/	/	/	*	/	*	/	/	*	*	

FIGURE 2 Illustration of "Meshing" between Mother and Infant. "*" represents higher rating scores (4,5), "/" represents lower ones (3,2,1) for all the maternal variables and for three infant variables (Pleasant, Irritable, and NR to ST).
"*" represents lower Fuss / Cry, "/" represents higher Fuss / Cry.
The vertical numbers of 3 figures indicate the Identification Numbers for the subjects. "≠" indicates difficult cases to classify.

omitted because of the infants' missing data.

Comparing the numbers of "✱" between B_1-B_3 and B_4 & C, 5 out of 16 B_1-B_3 mothers had seven (31.25%), whereas none of B_4 & C mothers got seven (0%). Two of B_1-B_3 had six (12.5%), 3 had five (18.75%), 4 had four (25%), while 1 of B_4 & C had six (9.1%), 2 had five (18.2%), 2 had four (18.2%). With regard to few positive results, one of B_1-B_3 had only one "✱" (6.25%), one had no "✱" but had seven "／" (6.25%), whereas one of B_4 & C had two (9.1%), 2 had only one "✱" (18.2%), and 3 had no "✱" but seven "／" (27.2%).

Nine out of 16 B_1-B_3 infants got four "✱" (56.25%), whereas 3 out out of 11 B_4 & C infants had four "✱" (27.2%). Five of B_1 -B_3 had three (31.25%), one had two (6.52%), and one had only one (6.52%). Four of B4 & C got three "✱" (36.4%), one had only one (9.1%) and three had no "✱" (27.3%).

From these results, the differences between B_1-B_3 and B_4 & C in general were characterized by the arrangements of "✱" and "／". In other words B_1-B_3 mothers and infants on the whole formed more "✱" patterns, but B_4 & C mothers and infants on the whole formed less "✱" patterns. The differences in the results of the two attachment groups can be understood clearly by the contrasting arrangements of each pair. How to mesh with each other or how to compensate for each other can be indicated by the figures. From figure 1, we can see there are (1) good "meshing" pairs (Nos. 105, 111, 121), (2) "meshing" somehow by compensating mother's inadequacy on the part of infant (Nos. 102, 117), (3) moderate "meshing" by covering up for each other (the other numbers). Compared with figure 1, figure 2 indicates (1) "out of tune" pattern because of low keyed or negative affect and behavior of the two (Nos. 106, 206), (2) "out of tune" by infant's temperamental factors (No. 211), (3) somehow "out of tune" by maternal factors (Nos. 214, 212, 115), (4) "meshing" somehow by compensating the partner's inadequacy with each other (Nos. 110, 116, 207, 114).

The reasons why the same moderate "meshing" types were classified as different "quality" of attachment is that one which was called "secure" and the other "insecure", may be open to further discussion. One possible interpretation can be derived from the results of infant negative reactions to a stranger. Even if the mother and infant dyad harmonized or meshed with each other in a usual situation like home environment, infant's affect and behavior may change and be extremely limited in a strange situation. If the stress given by the strange situation is beyond their permissible limits, they tend to have some type of emotional disturbance. As a consequence they cannot cope with the situation by employing the usual modes of interaction. These reponse styles to strangeness can be regarded as their temperamental disposition.

CONCLUSIONS

Regarding the origins of individual differences in attachment, Ainsworth et al (1978) argued that in the first quarter of the first year mothers of infants later classified as insecurely attached were significantly more unresponsive to crying and displayed a lower proportion of affection and tender holding during pickups than did mothers of securely attached infants. But the examination of 29 subjects in this study could not confirm her findings.

Recently Belsky et al (1984) pointed out that "it would be inappropriate to conclude

that more maternal involvement and interaction with the infant is synonymous with sensitive care" (p. 719). They discussed their results in terms of "mother's relatively greater influence in determining individual differences in attachment, with overstimulation leading to avoidance, understimulation leading to resitance, and inermediate levels of stimulation leading to security" (p. 718).

In our sample, it is true that the level of maternal stimulation of C babies was found to be the lowest and that of the B babies was intermediate or high. However it may not be appropriate to conclude that the mother's stimulation is the only factor influencing the infant's behavior in the Strange Situation. For according to our finding temperamental disposition may also determine the result of his (her) behavior in the Strange Situation.

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INDIVIDUAL DIFFERENCES IN RESPONSES TO UNFAMILIAR OBJECTS AT TWENTY-THREE MONTHS OF AGE

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The relationship between the response of 40 infants at 7.5 months toward a stranger, their classifications in the Ainsworth Strange Situation at 12 months, their response, at 23 months, to three unfamiliar objects (a peer, a stranger and a robot) and, their tendency toward behavioral inhibition, assessed at 27 months, was examined. Results show that Type-B children tended to approach the unfamiliar objects more frequently across three situations than Type-C children. However, the response was also related to the results of behavioral inhibition obtained at 7.5 and 27 months. Furthermore, there were individual differences within B type children in terms of Ainsworth's sub-classifications. The interactional effect between the behavior types in the Strange Situation and temperamental behavior characterristics on approach behaviors was discussed.

Key words : attachment classification, temperament, unfamiliar object situation, individual difference

Two main paradigms concerning developmental continuity of socioemotional behavior in infancy and childhood can be identified. One is based on Ainsworth's Strange Situation assessment, the other is based on temperamental behavior characteristics in a child.

Researchers who support the former paradigm insist that quality of attachment in early development influences adaptive behaviors in many domains of later development. They have demonstrated the differential effects of attachment qualities, A, B and C, at 12 to 18 months of age, on cooperation and compliance with their mothers and an unfamiliar adult (Londerville & Main, 1981) and frequency of symbolic play bouts (Main, 1983) at 21 months of age, problem-solving style at 24 months of age (Matas, Arend & Sroufe, 1978), competence in peer interaction at 42 months of age (Waters, Wippman and Sroufe 1979),

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dependency on their teachers at age 4 years (Sroufe, Fox, Pancake, 1983) and ego-resiliency and ego-control at age 4-5 years (Arend, Gove, & Sroufe, 1979). These studies argued that children who had been securely attached to their mothers (B type) behaved in a significantly positive manner and their behavior were more adaptive than that of both types of nonsecurely attached children ; A and C.

The above long term effects of early attachment qualities have been accounted for based on the assumption that the attachment relationship between an infant and its mother who is responsive and sensitive to her child's intentional cues in infancy provides a secure base for exploration of the environment, and that such an effective (secure) relationship supports and promotes object-mastery and a developed a sense of effectance in the child (Srofe & Waters 1977 ; Arend, Gove, & Sroufe 1979). "Thus, continuity in quality of adaptation is seen as resulting from the child's functioning with respect to developmentally salient issues and its subsequent effects on later adaptation *in conjunction with* environmental support" (Arend, Gove, & Sroufe 1979, p. 957). Further, this continuous effect was considered as not *specific* competences or skills but *underlying* competence, i. e., quality of adaptation or *style*. For example, Waters, Wippman, & Sroufe (1979) noted that "it was expected that quality of attachment in infancy (reather than an index of early peer interaction skills) would predict competence and effectance in the peer group" (p. 828).

However, they did not assess the mother-infant (child) relationship at the same time as measurement of attachment quality in Ainsworth's Strange Situation. Matas et al. (1978) also noted that "although the strange-situation classifications were based on the child's behavior (*mother's behavior not entering* into the classifications at all), they also were *presumed* to reflect maternal sensitivity to infant signals during the first year" (p. 555 italics added). Moreover, Grossmann, Grossmann, Spangler, Suess and Unzner (1985) showed that maternal sensitivity did not clearly relate to individual differences between children in the Strange Situation, and was not stable for the later half of the first year. As a result, it leaves room for interpretaion of individual differrences in the strange situation as reflecting the child's own disposition to such a novel circumstance, rather than the history of the mother's sensitivity.

Secodly, with respect to temperament, Lee and Bates (1985) showed a link between early infant temperament and later problem behavior via mother ratings on a questionnaire at ages 6, 13, 24 months and home observation of mother's control attempts to the toddler's trouble behavior at age 24 months. Miyake, Chen, Campos (1985) suggested that the child's own endogenous threshold for distress might play an important role in determining the infants behavior in the Strange Situation.

Campos, Barrett, Lamb, Goldsmith, & Stenberg (1983) also pointed out that "there seems to be evidence that C babies may be difficult babies from earliest infancy and that certain aspects of their Strange Situation performance (e. g., their threshold to cry and their passivity) may be evident long before the attachment relationship is built" (p. 868). According to the above suggestion, the attachment types classified in the Strange Situation are hypothesized to overlap with temperamental behavior characteristics. But, although Usui & Miyake (1985) adminstered two kinds of questionnaires, Infant Temperamental Scale and Early Childhood Personality Inventory, at 8, 16, 27 and 40 months of age and found a longitudinal consistency in the temperamental dispositions such as difficulty of

soothing, and behavioral inhibition, their results showed few relationships between the temperamental features and the attachment types. Matas et al. (1978) also found that a temperament factor they derived did not distinguish between attachment groups.

As Sroufe insisted that the issue of individual differences in behavioral manifestions influenced by temperamental dispositions is at a different level of analysis from attachment classification, and that temperamental differences do not directly influence the result of infant behavior in the Strange Situation (Sroufe, 1985, p. 3), do the children's behavior types in the Strange Situation interact with the temperamental behavior features? In the present study, we demonstrate the interaction between the early attachment relationship and temperamental dispositions.

METHOD

Subjects

Forty subjects drawn from two cohorts served as subjects (21 boys, 19 girls) (see Usui & Miyake (1985) for details on the background of the subjects).

Procedures

Subjects had been assessed several times either in their home, at our laboratory or both from birth to 40 months of age. This study examined relationships of the data from 7.5 months, 12 months, 23 months and 27 months assessments.

Assessments at 7.5 months. Subjects were tested for stranger and separation distress in the laboratory of our research center. The procedure was similar to the Ainsworth Strange Situation and consisted of the following six episodes : mother-infant free play ; stranger entry ; mother departure ; stranger depature ; stranger re-entry ; re-union with mother. Except for the first episode (3 minutes), each episode lasted for 2 minutes (see Miyake & Chen (1985) for details). A global judgement of "fearfulness" was derived, computed as the presence of avoidance and negative vocalization reflecting reaction to a stranger and to separation from the mother. Through the procedure, infants were classified into either "fearful" or "not fearful".

Assessements at 12 months. Ainsworth's Strange Situation procedure was carried out on all the infants and their mothers. The procedure followed Ainsworth's standard version, but episodes, 4, 6 and 7 were cut short if distress exceeded a maximum of 2 minutes. Based on the assessment, infants were classified into one of three attachment types (but, no type A were found) following the Ainsworth rating system by three trained raters.

Assessments at 23 months. Subjects were assessed for their inhibited reactions in three unfamiliar situations which consisted of meeting an unfamiliar adult, an unfamiliar peer and a novel robot at our laboratory.

a. *Stranger Situation :* When a subject toddler played freely at presence of the mother, an unfamiliar woman entered the room and after sitting silently in a chair in a corner of the room for 30 seconds, she approached the toddler showing picture cards adopted from PPVT and demanded that the toddler to give the name of the picture drawn on the card.

b. *Peer Situation* : Two toddlers and their mothers who were unfamiliar to each other entered a play room furnished with available toys and the children were given a chance to

play freely for 20 minutes.

c. *Robot Situation* : A toddler and the mother were introduced into a room where a "robot" made of tin cans, about 120 cm high, suddeny appeared, but exhibitied no movement. (See Nakano (1984) for full details of the three situations).

Spontaneous approaches or non-approaches were perfomed in each the three situations and were rated from videotapes by two independent raters without knowledge of the assessment using a two point (0 or 1) scale.

Agreement between independent raters through the 23 months assessment was 100%.

Assessment at 27 months. Mothers of subjects were asked to answer items relating to the child's personality . It contained eight sub-scales, concerning temperamental qualities and competences, including "Approach-Withdraw" tendencies (See Usui & Miyake (1985) for full details of the sub-scales). Based on maternal answers, subjects were divided into either "inhibited" children, who were characterized by a greater tendency to withdraw compared with the mean scores, or "not inhibited" children, who stand the opposite tendency.

RESULTS AND DISCUSSION

Attachment Classification

Of the forty children available for this study, 24 (17 boys, 7 girls) were classified as B type, 16 (4 boys, 12 girls) as C type (including Pseudo-C) and none as A type. (See Miyake & Chen (1985) for the whole distribution of all subjects at 12 months).

Relationship between attachment classification and cross-situational consistency in approach

1. *Inter-relationships between approach to a stranger and to a robot and attachment classification.*--There were 16 toddlers who showed a spontaneous approach to the stranger before she demanded it. They consisted of 12 B-type and 4 C-type (table 1). Comparision of the two attachment types showed that half of the Bs did approach the stranger, but three quarters of the Cs did not. However, this trend was not significant.

Reactions to the robot distinguished the attachment groups. About half (14) of the Bs went near the robot whereas only 3 of the Cs did. This difference was significant by the x^2 test ($x^2 = 4.64$, $p. < .05$). However, it was considered as a reflection of individual differences within B types that they did not show any clear trend, but they were divided into either approach or non approach in both situations.

Then, reactions to both situations were combined into a 2×2 contingency table as represented in table 1. Results demonstrated that none of the Cs tried to approach both unfamiliar objects and 56.2 percent of them approached neither, while 25.0 percent of B types approached both and only 16.7 percent neither. This group difference was significant by the x^2 test ($x^2 = 7.33$ $p. < .05$). Within C types, there was a significant tendency for subjects to approach neither objects ($x^2 = 6.07$, $p. < .05$). But, in contrast, B type toddlers were almost equally distributed over all cells. Moreover, about half of the Cs (7/16) just as in Bs (14/24) showed approached either the stranger or the robot. In summary, results suggested that attachment type C toddlers showed less tendency to approach both unfamiliar objects than B type, while B types did or did not approach them reflecting individual differences based on underlying factors other than the attachment classification.

TABLE 1

Inter-Relationships between Strange Situation Classification, Rsponse to a Stranger and to a Robot.

Strange Situation Classification			Approach to Robot: Yes B	Approach to Robot: Yes C	Approach to Robot: No B	Approach to Robot: No C	Total Responses to Stranger B	Total Responses to Stranger C
Approach to Stranger	Yes	B	25.0% (6)		25.0% (6)		50.0% (12)	
		C		0.0% (0)		25.0% (4)		25.0% (4)
	No	B	33.3% (8)		16.7% (4)		50.0% (12)	
		C		18.8% (3)		56.2% (9)		75.0% (12)
Total Responses to Robot		B	58.3% (14)		41.7% (10)		100.0% (24)	
		C		18.8% (3)		81.2% (13)		100.0% (16)

TABLE 2

Inter-Relationships between Strange Situation Classification, Response to a Peer and to a Robot.

Strange Situation Classification			Approach to Robot: Yes B	Approach to Robot: Yes C	Approach to Robot: No B	Approach to Robot: No C	Total Responses to Peer B	Total Responses to Peer C
Approach to Peer	Yes	B	41.7% (10)		8.3% (2)		50.0% (12)	
		C		0.0% (0)		31.2% (5)		31.2% (5)
	No	B	16.7% (4)		33.3% (8)		50.0% (12)	
		C		18.8% (3)		50.0% (8)		68.8% (11)
Total Responses to Robot		B	58.4% (14)		41.6% (10)		100.0% (24)	
		C		18.8% (3)		81.2% (13)		100.0% (16)

2. *Inter-relationships between approach to a peer and to a robot and attachment classification.*--The proportion of toddlers who showed spontaneous approach behavior to the peer play mate during the first 5 minutes was just 50 percent in B types and 31.2 in C-types. Though this result seemed to suggest that the attachment type B toddlers could show more of an approach to their playmate than C-types, the trend was not significant.

Reactions to an unfamiliar peer were combined with reactions to the robot and compared in a 2×2 contingency table as represented in table 2. The clearest result was that nearly half of the Bs showed approach to both the peer and the robot whereas none of the Cs did. This tendency was significant ($x^2=6.67$ $p.<.01$) and was congruent with Waters et al. (1979), who demonstrated peer competence was better in the securely attached group. It was not found, however, that there was a difference between attachment groups in the proportion of the toddlers who approached neither the peer not the robot. Another significant tendency was found with the distribution over cells in the contingency table within B-type ($x^2=4.29$ $p.<.05$). Thus, as presented in table 2, attachment type B toddlers demonstrated a strong linkage of approach behavior between a peer and a novel object and were nearly divided into two groups, approach both or approach neither. Within C-type toddlers, such a trend was not significant.

3. *Inter-relationships between approach to a peer and to a stranger and attachment classification.*--Table 3 presents the combined results between reactions to a peer and the robot, related to the attachment groups. It indicates that over half the toddlers (10/16) in the C-type group showed approach to neither a peer nor the robot whereas B-type toddlers were divided into just four sub-categories.

Thus, it is suggested from the results that the two attachment groups may be controlled by different kind (s) of factor (s). Temperamental disposition may one such factor. The relationship between approach trends in the above two situations and classification as temperamental disposition based on a maternal questionnaire (ECPI) at 27 months of age was examined (table 4). All toddlers who approached neither a peer nor a stranger were classified as *inhibited* and almost all the children who approached both were *not inhibited* ; not only within the B-type group but also between the two attachment groups. Therefore, the behavioral tendency to approach or not to approach both a peer and a stranger at 23 months of age remained stable until 27 months because the ECPI also measured Approach-withdrawal in an interpersonal situation.

4. *Inter-relationships between approach to a stranger, response to testing demand and attachment classification.*--Reactions of each toddler to a stranger were compared with smooth responses to stranger's demand for answering the test. B-type children were compliant with the demand whether or not they approached her. Table 5 shows the results of this analysis. This trend was significant ($x^2=4.29$, $p.<.05$). In contrast, almost half (5/12) of C type toddlers who did not approach a stranger made some response to her in the situation though it was not significant.

As a result, almost the same proportion of children of both attachment groups were compliant with her after period of time. Thus, it is suggested from the results that some of C-type toddlers can approach a stranger, though passive, but the other Cs and the Bs who did not approach showed more resistance to answer the stranger. Results were compared with behavioral inhibition reported from ECPI at 27 months of age. As presented in table

TABLE 3

Inter-Relationships between Strange Situation Classification, Reacton to an Unfamiliar Peer and to Stranger.

Strange Situation Classification			Approach to Stranger: Yes B	Approach to Stranger: Yes C	Approach to Stranger: No B	Approach to Stranger: No C	Total Responses to Peer B	Total Responses to Peer C
Approach to Peer	Yes	B	25.0% (6)		25.0% (6)		50.0% (12)	
		C		18.8% (3)		12.5% (2)		31.3% (5)
	No	B	25.0% (6)		25.0% (6)		50.0% (12)	
		C		6.2% (1)		62.5% (10)		68.7% (11)
Total Responses to Stranger		B	50.0% (12)		50.0% (12)		100.0% (24)	
		C		25.0% (4)		75.0% (12)		100.0% (16)

TABLE 4

Inter-Relationship between Behavior Inhibition, Approach to an Unfamiliar Peer and to a Stranger.

(a) Attachment Type B

ECPI at 27months			Approach to Stranger: Yes Inhb	Yes Non	No Inhb	No Non	Total Inhb	Total Non
Approach to Peer	Yes	Inhb	0		1		1	
		Non		5		1		6
	No	Inhb	1		4		5	
		Non		4		0		4
Total		Inhb	1		5		6	
		Non		9		1		16

(b) All Subjects

ECPI at 27months			Approach to Stranger: Yes Inhb	Yes Non	No Inhb	No Non	Total Inhb	Total Non
Approach to Peer	Yes	Inhb	1		1		2	
		Non		7		2		9
	No	Inhb	1		12		13	
		Non		5		0		5
Total		Inhb	2		13		15	
		Non		12		2		14

TABLE 5

Inter-Relationships between Strange Situation Classification, Approach to a Stranger and Compliance to Demand for Test.

Strange Situation Classification			Approach to Stranger: Yes B	Approach to Stranger: Yes C	Approach to Stranger: No B	Approach to Stranger: No C	Total Compliance B	Total Compliance C
Compliance to Stranger's Demand	Yes	B	41.7% (10)		16.7% (4)		58.4% (14)	
		C		18.8% (3)		31.2% (5)		50.0% (8)
	No	B	8.3% (2)		33.3% (8)		41.6% (10)	
		C		6.2% (1)		43.8% (7)		50.0% (8)
Total Responses to Stranger		B	50.0% (12)		50.0% (12)		100.0% (24)	
		C		25.0% (4)		75.0% (12)		100.0% (16)

TABLE 6

Inter-Relationships between Behavior Inhibition and Comliance to Stranger's Demand.

	Compliance to Stranger's Demand: Yes	No	Total
Inhibited	3:2	3:7	6:9
Non	8:3	2:1	10:4
Total	11:5	5:8	16:13

(In Order B: C)

6 inhibited children were less compliant with the stranger's demand than non inhibited children ($\chi^2 = 4.30$, $p. < .05$). Therefore, compliant responses assessed in this situation are accounted for behaivioral inhibition measured by ECPI as same as consequence of attachment types assessed in the Strange Situation.

5. *Consistency of approach to an unfamiliar object across three situations.*—Individual differences in the number of situations in which approach to an unfamiliar object was shown were examined in relation to to attachment classification. Results are presented in figure 1. Most of attachment type C toddlers tried to approach in none or only one

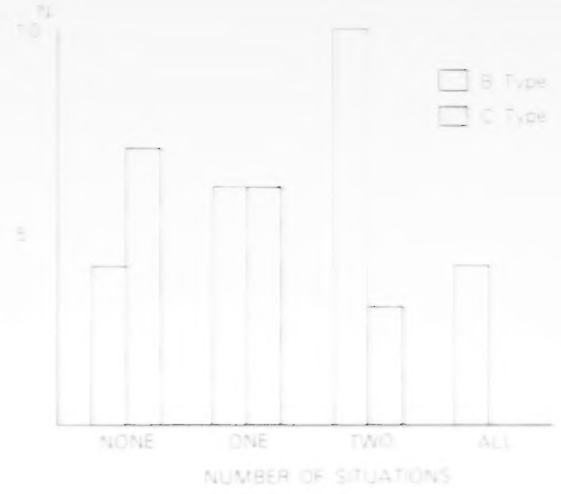

FIGURE 1. Consistency of Approach to Unfamiliar Objects through the Three Situations

situaton while B-types did to do in two or all. This trend was nearly significant ($x^2=7.28$, $df=3$, $.05<p.<.10$). When none and one, versus, two and all approaches are combined, the phi correlation was significant ($\phi=.34$, $p<.05$).

Thus, it is suggested that though child's behaviors assessed in the Strange Situation at 12 months were different from the assessment done in unfamiliar situations at 23 months, the former is predictive of the latter. This predictability of the cross-behavioral, cross-situatonal and cross-age of attachment is congruent with the studies favorable to attachment performed by Matas et al. (1978), Arend et al. (1979), Waters et al. (1979), Londerville & Main (1981), and so on. They, reported in generally B-type (secure) toddlers are more sociable and adaptive functioning, i. e. competent than non-B (anxious) toddlers.

However, one should note that the difference between B- and C-types only applied to those children who made at least 2 attempts in approching the unfamiliar objects (fig. 1). Moreover, the difference between B- and C-type children was significant, when the combined categories of number of "approach two or more" v.s. "approach one or none" were compared ($x^2=6.25$, $p<.05$). Thus, it was concluded that only the behavior of C type babies in the unfamiliar object situation can be predict by the attachment classification.

We then compared the results from unfamiliar object situation with the results obtained using the ECPI at 27 months. The resuts are presented in table 7. They indicate that the number of approaches of both B- and C-types is linked with the inhibition/not-inhibition classification. By dividing the babies into those who approached unfamiliar objects at most once and those who approached at least twice, the inhibition / non inhibition classification was high and significant ($\phi=.05$, $p.<.01$). The numberns of approach attempts differed significntly between those toddlers who were judged to be inhibited and those who were judged to be not inhibited at 27 months ($x^2=14.76$, $p<.01$). Therefore, these results may be interpreted as suggesting that the incibited/not-inhibited dimension as

TABLE 7

Inter-Relationships between Attachment Type at 12 Months, Number of Approaches to the Unfamiliar Objects at 23 Months and Behavioral Inhibition at 27 Months.

	Number of Approaches to Unfamiliar Objects							
	None		One		Two		All	
	B	C	B	C	B	C	B	C
Inhibited	3	6	2	2	1	1	0	0
Non	0	0	2	2	5	2	3	0

TABLE 8

Inter-Relationships between Attachment Type at 12 Months, Approach Behavior at 23 Months and Fearful Tendency at 7.5 Months.

	Number of Approaches to Unfamiliar Objects							
	None		One		Two		All	
	B	C	B	C	B	C	B	C
Fearful	3	6	1	3	2	3	0	0
Not Fearful	1	0	5	1	4	0	3	0

a temperamental disposition postulated in the ECPI is predictive of whether or not a child would approach in unfamiliar situatuions.

However, the above interpretation has a weak point that the two kinds of classification are different with respect to distance from the 23 months assessment, for inhibition was assessed only 4 months later, while attachment was assessed 11 months before. As a result, we could not exclude the interpretation based on time closeness. In addition, since the above interpretation is a retrospective one, the explanation is not a causal explanation. To make up for this, we examined the relation between the babies' approach/non approach behaviors with their reaction to a stranger at 7.5 months. As presented in table 10, the results are similar to the above. Half of the "fearful children" did not approach at all, while just half of the "notfearful children" made at least two approaches. The difference between "the fearful" and "the not fearful" groups at 7.5 months is significant ($x^2 = 9.56$, $p. < .05$) with regard to future responses. It is suggested that children's responses in unfamiliar situations at 23 months can be predicted by assessment their response at 7.5 months.

Thus, relationship between children's attachment classification and their behavior in the unfamiliar-object situations approached situation was examined again using subgroups of attachment classification. As shown in table 9, apart from C_2, subgroups divides into either the group with at least 2 approach or the group with at most one approach ($x^2 = 10.39$, $p < .01$). That is, toddlers who approached in none of the situations were either C_1 or B_3, whereas those who did in all three of them were either B_1 or B_2 without exception (C_1, B_3 vs. others ; $x^2 = 13.85$, $p \fallingdotseq .001$). Easterbrooks & Lamb (1979) also reported that B_1, B_2

TABLE 9

Cross-Situational and Longitudinal Consistency of Aboidant Behavior Related with Sub-category of Attachment Types and Behavioral Inhibition.

B TYPE

Number of Situations	Subject	12M. ATTA CLSS	ROB AVO	23M. STRG AVO	27M. PEER AVO	27M. ECPI INHB	7.5M. S.S. FEAR
None	2113	B3	*	*	*	*	
	2117	B3	*	*	*	*	*
	2208	B3	*	*	*		*
	2101	B3	*	*	*	*	0
One	2103	B3	*	0	*		0
	2104	B3	*	0	*	*	0
	2105	B3	*	0	*	0	0
	2112	B2	*	0	*	0	0
	2108	B2	0	*	*	*	*
	1104	B4	0	*	*		0
Two	1110	B2	*	0	0	0	0
	2203	B2	*	0	0	0	
	2115	B4	0	*	0		*
	1107	B2	0	*	0	*	0
	1106	B2	0	*	0		*
	1214	B2	0	*	0		
	2109	B1	0	*	0	0	0
	2111	B2	0	*	0		0
All	1113	B3	0	0	*	0	
	2110	B4	0	0	*	0	
	1208	B2	0	0	0	0	0
	2202	B1	0	0	0	0	0
	2201	B1	0	0	0	0	
	1212	B2	0	0	0		0

C TYPE

Number of Situations	Subject	12M. ATTA CLSS	ROB AVO	23M. STRG AVO	PEER AVO	27M. ECPI INHB	7.5M. S.S. FEAR
None	1109	C1	*	*	*	*	*
	2206	C1	*	*	*	*	*
	2211	C1	*	*	*	*	*
	2116	C1	*	*	*	*	
	2207	C2	*	*	*		*
	2212	C2	*	*	*	*	*
	1206	C1	*	*	*		*
One	2214	C2	*	0	*	0	*
	1205	PC	*	*	0	0	
	1207	C1	*	*	0	*	*
	1102	PC	0	*	*	*	*
	1209	PC	0	*	*		0
	1217	C2	0	*	*		
Two	2114	PC	*	0	0	*	*
	1211	C2	*	0	0	0	*
	1213	C2	*	0	0	0	*

NOTE

*: Yes 0: No
ATTA CLSS: Attachment Classfication
AVO: Avoidant INHB: Iinhibited
S.S.: Strange Situation

infants not only engaged in more frequent and more sophisticated interaction with unfamiliar peers and adults but also were more independent from their mother than B_3, B_4 infants at 18 months old. Thus, it is suggested that the Ainsworth's attachment classification system has some limitation When applied to our present data *in detail* though it explains a *general* profile of them. Then, what criteria would be brought from this result as more valid one ? The distinctive features of B_3s and C_1s from others are their high proximity seeking and contact maintaining (Ainsworth, Bleher, Waters & Wall 1977 ; Sroufe & Waters 1977). In short, they are diffcult to separate from their mother in a strange situation. This fact suggests that as the Ainsworth's classification system consists of multiple scales, only some of them relate to some of the later competences.

CONCLUSION

The present study demonstrated that Ainsworth's attachment classificaton had some limitations when applied to our present data. Our study also shows that the pattern of attachment classification partially overlaps with that of children's response in the unfamiliar object situation (see TABLE 9). Moreover, our data show that the children's behavior at 23 months is predicted by "the fearfulness" obtained at 7.5 months the same as by attachment types obtained at 12 month.

Of course, it is to be noted that our procedures are not identical with those adopted in studies by, for example, Matas et al. (1978) and Waters et al. (1979). However, it is reasonable to say that remote effects of the attachment type on later competence can not exclude the possibility of the interpretation according to an interaction between temperamental factors and children's sense of effectance.

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LIFE-SPAN DEVELOPMENT OF AFFECTIVE RELATIONSHIPS

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This paper presents a model of affective relationships and a review of a number of empirical studies based on it. The model is proposed to describe the life-span development of affective relationships, which are measured in terms of one's representation of a variety of significant interpersonal relationships. These central and relatively stable social relationships are supposed to govern one's behaviors of socio-affective interaction. The review of the empirical studies suggests that there are at least five developmental stages of affective relationships from infancy to old age and three rules of developmental transformations.

Key words : affective relationships, life-span development, developmental stages

This article proposes a model of affective relationships —— the core and relatively stable social relationships —— in life-span perspective, and also reviews some empirical studies based on the model. The affective relationships are measured as representations of interpersonal relationships which regulate the behaviors of satisfying the need for affective interactions, by which I mean the need to have emotional ties or exchange love with significant others. These affective relationships will appear in a variety of ways, such as living together, exchanging warm attention and help, sharing information and pleasant / sad experiences, and getting psychic support. The relationships determine what I shall call the contents of affective behaviors, that is, the figures to whom the behaviors are directed, the functions of each figure, the behavioral modes used for each figure, and the likelihood of occurrence of each behavior.

HOW TO CONCEPTUALIZE AFFECTIVE RELATIONSHIPS

Affective relationships include many kinds of social relationships. Firstly, they naturally include love relationships, according to the taxonomy in terms of familiarity (Lewis, 1982), which refer to the most intimate social relationships among the three types : love, friend and acquaintance relationships. They also often include relationships with figures who do not belong to the most familiar class of persons. For example, some friends play a much more important role as psychic support than friends in a usual sense do. And it is also possible to have an affective relationship with a person or spiritual/ symbolized one with whom one is not even personally acquainted like a respected person, a historical figure or God.

The earlier version of this paper was presented at a seminar held on the occasion of Prof. Michael Lewis' visit Tokyo, December 1984. Helpful comments from Professor Lewis are gratefully acknowledged. I would like to express my deep appreciation to Professor Giyoo Hatano for his insightful comments on this study. The overall conceptualization was substantially enriched by his suggestions.
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So-called attachment relationships form only a part of affective relationships. The term 'attachment' in Western countries, despite a number of discussions on its conceptual reconsideration (e. g., Kalish & Knudtson, 1976 ; Weinraub, Brooks & Lewis, 1977), has been used unfortunately in a limited and narrow sense (Hinde, 1982). Updated theory and research on 'attachment' have clarified the definition of the term in a recent monograph (Bretherton & Waters, 1985). In earlier work (e. g., Takahashi, in press-a ; in press-b), I used the term 'attachment' to refer to the core of social relationships. However, now I use the term 'affective relationships' instead of 'attachment relationships', because the term 'attachment' has a special connotation based on the Bowlby-Ainsworth theory. That is, the term 'attachment relationships' refers to a person's special relationships with those whom s/he perceives as stronger and/or wiser than s/he (Bowlby, 1977). Though this kind of relationship is surely observed not only in infants and young children but also among adults after separation/loss (Bowlby, 1980 ; Weiss, 1975), I would like to emphasize that in addition to that there are other close relationships within which an active exchange of affections can actually supply resources to cope with the grief of separation/loss and to help re-actualize oneself in her/his social life.

Though voluminous research has long concerned the development of social relationships, it has failed to give us clear pictures of social development. The first limitation comes from the traditional dyadic paradigm of research. Even infants, as social beings, have multiple relationships. However, most studies have investigated the social relationship between a child and one figure. The studies of the mother-infant relationship are a typical instance. Most of them have concerned the mother-infant relationship alone, and they have hypothesized, without recognizing how oversimplified their formulations are, that the quality of the mother-infant relationship was of paramount importance and governed all subsequent social development. Though the role of the mother is indeed conspicuous among infants, she is not the only figure to interact with and affect them. Moreover, if we consider the expanding and changing human relations as children grow older, we cannot accept the above deterministic hypothesis. Even when a few researchers have recognized this limitation, they have failed to find effective research strateiges to describe just who is affectively relating to whom, and how (Furman, 1984). Some studies (Kojima, Kawai, Yamada & Murakami, 1985 ; Lewis & Feiring, 1982) have begun to examine a triad and more relations in one and the same situation. Predictably, they have come to be forced to struggle with the complexity of human interactions. Lewis and his colleagues (Weinraub, Brooks, & Lewis, 1977 ; Lewis, 1982) propose a social network model to describe a whole social map of a person as a social being. However, I doubt whether the essence of an individual's social relationships can be depicted by the 'social object-function matrix' of a social network.

The second limitation is the lack of a life-span perspective. Usually, each study is limited to one developmental period. However, we cannot gain the true insights into the nature of development by taking the sum of the discrete results of studies each restricted to one specified developmental stage. The information on development itself is limited. In other words, we need a 'motion picture' of ongoing development which shows and explains transitions from stage to stage, as Jean Piaget has given us in successfully describing cognitive development. Having the life-span perspective, Piaget described the

nature of each stage in cognitive development. He unearthed many facts of how children develop and found certain 'buds' which are important in future development but are of little worth in the stage in which they first occur.

To cope with the above two limitations, I have constructed a conceptual model of affective relationships in life-span perspective (Takahashi, 1974). I wish this model to be very useful to trace the successive transitions from infancy to old age. Accordingly, the construction of the model started with mature adults who would have the most complex and structured social relationships. Using the model, I then tried to trace the development of affective relationships from infancy to adulthood as a successive process of transformations. We can reasonably hypothesize that though the need for affective relationships is present throughout life, the contents of affective relationships will vary depending on developmental stages.

The research inso social relationships among adults has already suggested their complexity of their content (e. g., Troll, 1985). First, adults have a good many figures toward whom to direct social behaviors, including family members, relatives, friends, colleagues, respected persons, and so forth. Secondly, they surely differentiate the behavioral functions among their figures. Because of these functional differentiations, they can have affective relationships with many figures concurrently. Thirdly, adults have many kinds of affective behaviors and display them corresponding to the figure, situation, and opportunity. Finally, the strength of affective need will vary from figure to figure. We reasonably assume that the observed affective behaviors among adults are regulated by those representations of social relationships which can be characterized in terms of the properties outlined above.

THE CONCEPTUAL MODEL AND ITS ASSESSING INSTRUMENTS

For constructing a conceptual model of affective relationships, I have started by examining characteristics of the relationships in mature adults. In this report affective relationships are described in terms of the following four properties :

1. The figure of affective behaviors, to whom the affective behaviors are directed ; a person has many kinds of such figures.

2. The psychic function of each figure ; there is a variety of functions from the central one of deep psychic support to the almost instrumental.

3. The mode of affective behaviors, by which the need for emotional ties, and thereby for affective relationships, is expressed ; affective behaviors may be symbolic (that is to say, indirect), direct but distal, and both direct and proximal.

4. The strength of the need for affective relationships ; the intensity or frequency of affective behaviors to each figure.

To assess the conceptual model among college students and adults, I constructed two instruments concerning the above four properties, a Questionnaire of Affective Relationships (AR-Q) and a Sentence Completion Test of Affective Relationships (AR-SCT) (Takahashi, 1974).

The AR-Q consists of 24 statements describing concrete affective behaviors, each of whose function is fulfilled by using a given mode of behavior, and requires separate ratings on each item for each of six figures (mother, father, one sibling, the closest friend, love

object and respected person) on a 5-point scale (e. g., 'If possible, I want to be with X all the time.', 'When I receive bad news, I want to be with X.', 'I feel reassured when X agrees with me.', 'X makes me feel life is worth living.'). The above six figures were selected as target figures whom college students had named as the important persons in their psychic life in a preliminary study. As it is quite probable that some subjects have other significant figures than these six, additional figures, such as husband, children, and other important figures, are also rated depending on the kinds of subjects. The strength of the need for an affective relationship with each figure is the total over 24 items. According to the total score, one or more primary and important figures, called the focus (foci) are designated. Though it is most logical to consider as focus (foci) of affective relationships the n figures scoring highest, among which there are no significant differences, we simplified the procedure by regarding as significant any score difference of 10 or greater. Further examinations of the criteria of focus are needed.

The AR-SCT consists of 16 items concerning the figures emotionally supporting each subject (e. g., 'For me, my mother is·····.', 'For me, my closest friend is·····.', 'For me, God is·····.'), and the functions of each possible figure in her/his psychic life (e. g., 'The one that gives me moral support and a standard of judgement is·····.', 'The one that makes me feel life is worth living is·····.'). The AR-SCT was designed to check the responses in AR-Q in a different way.

The studies with college students of both sexes (168 females and 277 males, 20 to 21 years old) (Takahashi, 1974 ; 1980) indicated : First, they had several affective figures, including parents, sibling (s), close friend (s) of the same gender, love object (s) of the opposite gender, and respected person (s). Second, they varied their modes of affective behaviors according to the figure and occasions. Third, they clearly differentiated the psychic functions between figures, that is, they had one or more primary figures (focus/foci) who constituted the most important part of their affective relationships, and also had a few figures for the next most important part, and many other figures for less important parts. This constellation of differentiated relationships with figure-function pairs was given the term 'affective structure'. Finally, there were several types of affective structure concerning which some figure (s) were assigned a relatively more important role as focus (foci) than other figures as Table 1 shows. Though all types had the common structural properties mentioned above, each type had its own configuration of affective relationships and ways in which the various behaviors represented these relationships.

Having a mature assortment of affective relationships as the model of the final state of an ongoing continuous development, we would be able to describe the set of relationships for each period of one's life span as one of the manifestations of that development. However, as we had a methodological difficulty in assessing the same ppoperties of affective relationships among both adolescents and children, what I thought most necessary was to construct an assessing instrument which measured the same quality of affective relationships among subjects who would find it difficult to respond to the AR-Q and AR-SCT.

Using the conceptual model, I constructed a Picture Affective Relationships Test (PART) for young children (Takahashi, 1978). The PART consists of two sets of 8 to 18 cards, one set for girls and one set for boys. As shown in Figure 1, each card illustrates

TABLE 1

Number and Type of Affective Structure among College Students

Type of attachment structure	Female	Male
One-focus type	57	120
Mother type	15	2
Love object type	28	99
Closest friend type	4	9
Respected person type	8	9
Father type	1	1
Sibling type	1	0
Multi-focus type	196	152
Two-focus type	40	74
Three-focus type	40	54
Four-or more-focus type	26	24
Undifferentiated-focus type	5	5
Total	168	277

a daily life situation in which affective behaviors to another person will be induced in young children (e. g., 'When you play out of doors, whom would you like to play with you?', 'When you take a bath, whom would you want to take a bath with you?', 'When you want to read a book, with whom would you want to read a book?'). Testing is done individually, using a set of cards. During a test session, a child is asked to suppose the major figure in the picture is her/himself. Shown each card, a child is asked to tell the name of a person to whom s/he wants to relate (in the space of the dotted line). The relative strength of the need to relate toward each figure is the total frequency over all the cards. As the index of the relative dominance of figure (s), that is of type of focus, the figure, if any, which was named in more than half of the total PART cards was termed the dominant figure. The function of each figure is inferred from the situations in which the given figure is selected. In the case of the PART, the modes of social behaviors are not asked, because of the limited ability of young children to report. Children 4 to 6 years of age are interviewed

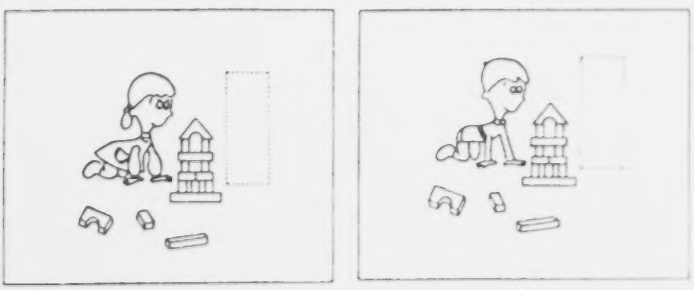

FIGURE 1. PART Card (a: for girls, b: for boys) "When you play at home, who would you like to play with ?"

individually, and elementary schoolers (6 to 12 years of age) are given in groups the reduced-size edition of the PART for elementary school children. In the cases of 1- to 3-year-old children, the primary caregiver is individually asked how the child would respond to the PART for the very young children based on what s/he has already observed in the child's daily life.

Whether both PART and the two written instruments measure the same psychological constructs was examined among 13- to 14-year-old junior high school pupils. One hundred thirty two 9th graders of both sexes (70 boys and 62 girls) were administered the AR-Q and AR-SCT, and also, with two weeks' interval, the PART. For each affective behavior figure, there was a significant, positive correlation between PART and AR-Q ($r = .29$, $p < .05$ to $.56$, $p < .01$). However, there were three other significant correlations between the two measurements : among girls, the PART frequency of mother with both the AR-Q scores of sibling and those of closest friend of the same gender ($r = .30$, $p < .05$; $r = .26$, $p < .05$, rersectively) ; among boys, the PART frequency of mother with the AR-Q score of father ($r = .43$, $p < .01$). Moreover, 48 out of the total 132 children were identified as having a dominant figure in their affective relationships by the PART. Fifty percent of these 48 classified as one and the same focus type by the AR-Q, 31% of them got the highest AR-Q score and were rated as multi-focus types, but with one identifiable figure exceeding the others, and 10% got the second or third highest scores and were identified as multi-focus types with three or four figures about equally dominant. Two children were classified into undifferentiated-focus type, because of no clear score differences among six figures. Only 2 children were classified into a different one-focus type from PART by the AR-Q ; one peer-dominant type child was identified as respected- person-dominant type and one cousin-dominant type child was identified as peer type. From this overall harmony of results, we can conclude that the PART reveals the same kinds of affective figures and also the degree of importance, though it is a relative one, of each figure among children, as the AR-Q does among adolescents and adults. Depending on the same principle as the PART for children, I constructed a PART for elderly persons for whom the AR-Q and AR-SCT might impose a burden. Consequently, depending on the conceptual model, I have the instruments to assess the affective relationships from infancy to old age.

TRANSFORMATIONS OF AFFECTIVE RELATIONSHIPS IN LIFE-SPAN DEVELOPMENT

Though it is controversial how we characterize the different stages in the course of development (e. g., Tanner & Inhelder, 1960), there are at least the following five stages in transformations of affective relationships. Let me review the empirical studies of affective relationships from a life-span perspective.

The first stage : Appearance of affective relationships

The first one is the stage of appearance of the affective relationships with figures who surround a baby. A large number of studies in attachment relationships have revealed that at the latest by the sixth month after birth, infants have established an attachment relationship with the caregiver, usually the mother, and that this has continued and deepened till around their 18th month (Waters, 1978). Our study, based on the strange-situation procedure (Takahashi, in press-a) indicated that 68% of sixty Japanese 12-month-olds from middle class families had established secure (B type) attachment relationship

with the mother. The PART interviews with their mothers indicated that these infants already had affective relationships with multiple figures, including mother, father, and grandmother. The infants directed affective behaviors to the mother the most frequently, and interacted with her in most important functions of their 'survival', such as feeding, sleeping, soothing and nursing. At the same time, 36% of these 12-month-olds preferred the father to the mother as partners in co-bathing and play, which might be more peripheral but joy-producing functions for the babies. According to Yamada (1982), who observed one Japanese 14-month-old infant in daily situations described that the boy had multiple figures whose roles for him were articulated with considerable interdependence and compensation of one another : mother as nurturant caregiver, grandmother as generous presenter of special candy, grandfather as expert of repairing toys, sibling as play partner. The results reported by the studies on fathers in the US were also consistent with the above findings. For example, American babies from middle class families, while remaining positively attached to both parents, began to respond discriminately to the father and the mother in their the 7th to 8th month (Lamb, 1976), preferring the father to the mother in task-oriented or playful situations (Lamb, 1980 ; Clarke-Stewart, 1978-a), and using the father as a secure base when the mother was absent (Lamb, 1976). Thus, the abundant data suggest that affective relationships of 1-year-olds consist of multiple figures with some differentiations in the role of each figure.

The second stage : Extension of affective figures

The second important stage of the development of affective relationships is the beginning of the active extension of figures among toddlers. Though we are unable to specify when this second phase starts, some studies indicate that children, before their second birthday, are ready to begin to extend affective behaviors even to strangers, such as a familiar female adult (Clarke-Stewart, 1975 ; 1978-b ; Bretherton, 1978 ; Main & Weston, 1981 ; Takahashi, 1982), a friendly female stranger (Bretherton, Stelberg & Kreye, 1981), or an unfamiliar female adult who imitated the mother's behavior (Shaffran, 1974) or who responded contingently (Levitt, 1980). Our three studies among the total of 89 toddlers revealed that 19 to 29-month-olds surely exhibited affective behaviors to the female adult strangers (Takahashi & Hatano, 1982 ; Takahashi, in preparation). The children were observed in their affective behaviors to the mother and also four kinds of strangers : unfamiliar young female students of age 23, a female and male stranger who belonged to the mother's generation, and an aged female stranger, 66 to 68 years old, in the standardized situations. The findings were as follows. The toddlers continued to exhibit the affective behaviors to the mother, most frequently using proximal modes of interactions, such as touching and approaching. At the same time, they directed affective behaviors to all the female strangers, regardless of age differences from the mother, using distal modes of interaction (mostly looking), which were very different ways of contacts from those with the mother. Yet, on the contrary, the toddlers often hesitated to have contact with a male stranger. Some of them refused even to look at him. These children stood with their back to him with closing their eyes. If we assume that affective behaviors are generalized based on the stranger's socio-cognitive similarity to the referent (s), the above results suggest that the toddlers directed affective behaviors to the female strangers probably because of their perceived resemblance to the referent, the mother. In addition,

it is worth noting that 64% of the total subjects who had included the father as the figure of affective relationships in their prior framework, as reported by the mother in the PART interview, directed affective behaviors to the male stranger than those whose mothers had not reported their having affective relationships with the father. That is, at the encounter with the male stranger, only the children who had had the father as a referent of affective relationship positively interacted with him. It is assumed that if the children had not had the father as an affective figure, they would have been forced to use the mother as referent and would have recognized the male stranger as too different from the referent figure to direct affective behaviors toward. From our observations here, we can reasonably hypothesize that the prior framework of relationships mediates new encounters.

Affective relationships among 2-year-olds, reported in the PART interviews with 89 mothers, surely indicated the extensions of affective behaviors to multiple figures. Some of them preferred to the father in co-bathing (24%) and going out (35%), sibling (s) in playing indoors (45%), and peer (s) in playing outdoors (48%), though they continued to have mother-dominant affective relationships. These facts suggest that the extensions of figures are surely accompanied by the successive examinations of the functions of each figure. It is hypothesized that when a child encounters a more competent or proper figure who can bring much more satisfaction in a given function than the figure (s) who is fulfilling the function at present, s/he will replace the prior figure with the new one. Thus, the extensions of figures is always accompanied by severe examinations and also articulations of the roles of the figures, both old and new. For safety, if not survival, these extensions will first be attempted in the peripheral functions, such as the play function.

The third stage : Socialization of affective relationships

The third critical stage will be characterized as the socialization of affective behaviors in formal organizations. When children enter kindergarten and school, they must be strongly and rapidly pushed to extend their social interactions to out-of-family members, especially to agemates. And they are also trained to learn the suitable affective behavioral modes for each figure and situation. If a child can not have good contacts with agemates in kindergarten, or strongly insists on affective relations with the mother in public, s/he will be called a 'maladaptive child', 'dependent child' or 'mama's girl (boy)'. In fact, the interests of researchers move to peer relationships or friendships in childhood from the mother-infant relationship in infancy. Some studies (e. g., Lewis & Brooks-Gunn, 1979) claimed that some children, even infants, approached an unfamiliar child without ever having encountered one before. Other studies reported (Bronson, 1981 ; Kagan, 1981) that toddlers are too young to interact actively with peers. Recently, some studies have been concerned with how the definition of friendship changes as children grow older (e. g., Youniss, 1980). The process of acquaintanceships among agemates has suggested children's high abilities to form friendships (Furman, 1984 ; Oden, Herzberger, Mangione & Wheeler, 1984). However, it must again be emphasized that these previous studies isolated the agemate relationship from other relationships which must affect and interrelate with that relationships. Considered in a most favorable light, the researchers aimed to study just one relationship between a child and one 'dominant' figure in each developmental period.

Using the PART, five groups of children from 4 to 12 years old were interviewed on their affective relationships. They were children of pre-kindergarten (42 four-year-olds,

who were investigated at one month before entrance), kindergarten (71 six-year-olds, who had spent 18 months in kindergarten), and 2nd grade, 4th grade, and 6th grade (each about 200 children) (Takahashi, 1983). The results indicated that the children had several affective figures with differentiations of functions among figures. As shown in Table 2, the mother was the most important figure for pre-kindergarten children, but some of her functions were successively replaced by other figures as the child grew older.

There was only one card out of the 13 PART cards, a card of nursing when children were sick, to which the mother was most frequently assigned by the subjects of all three elementary school groups (See Figure 2). The father was included in the framework of affective relationships by half of the 4-year-olds as a co-bathing partner, and continued to be selected in rather peripheral or instrumental roles till 2nd grade and/or 4th grade, in such cards as 'When you travel in space---' and 'When you awake from a nightmare ---'. The agemates started to take their roles in the affective relationships as play partner outdoors among pre-kindergarten children. Siblings were selected as play partner at home. Peers gradually began to take more important roles and in the second year of kindergarten, they replaced the mother as going-out and reading partner, the father as going-out one and siblings as play-partner indoor. As Figure 3 indicates, among 6th graders, agemates were selected as the figures who shared emotional experiences, such situations as 'When something unhappy happens ---'.

TABLE 2

Figures of Affective Behaviors among Pre-Kindergarten and Kindergarten Children (%)

	Situation / Figure	Playing indoors	Playing outdoors	Reading together	Co-bathing	Going out	Selecting menu	Sitting together	Asking words
4 year old*	Mother	8	3	35 (83.3)	17 (40.5)	22 (52.4)	27 (64.3)	19 (45.2)	31 (73.8)
	Father	4	2	4	19 (45.2)	14 (33.3)	4	9	7
	Sibling	17 (40.5)	3	0	4	0	0	6	1
	Agemate	8	30 (71.4)	0	0	1	1	2	0
	Others	4	4	3	1	5	3	6	3
	Alone	1	0	0	1	0	6	0	0
6 year old**	Mother	3	3	19 (40.4)	16 (34.0)	14 (29.8)	32 (68.1)	17 (36.2)	24 (51.1)
	Father	2	4	3	22 (46.8)	13 (27.7)	9	13 (27.7)	11 (23.4)
	Sibling	12 (26.1)	5	5	4	5	1	9	6
	Agemate	26 (55.3)	34 (74.5)	10 (21.3)	3	11 (23.4)	2	6	3
	Others	2	1	8	1	3	1	2	3
	Alone	2	0	2	1	1	2	0	0

* 42 children of one month before entrance of kindergarten
** 71 children who spent 18 months in kindergarten

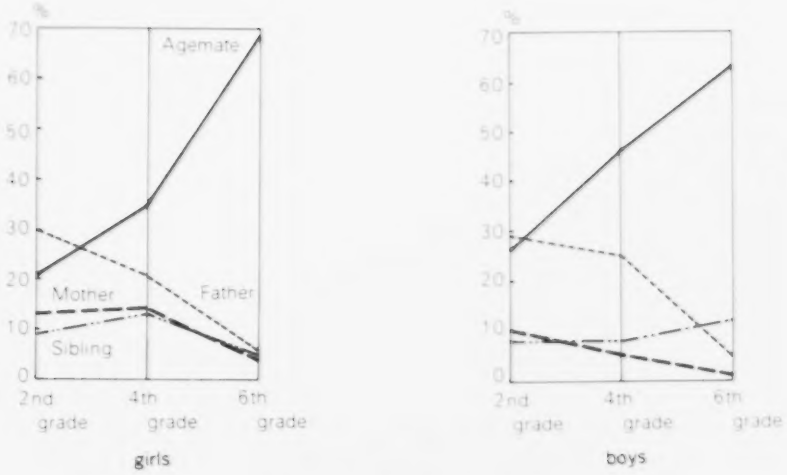

FIGURE 2. Figures Selected in PART Card of "When you travel in space" among Elementary Schoolers

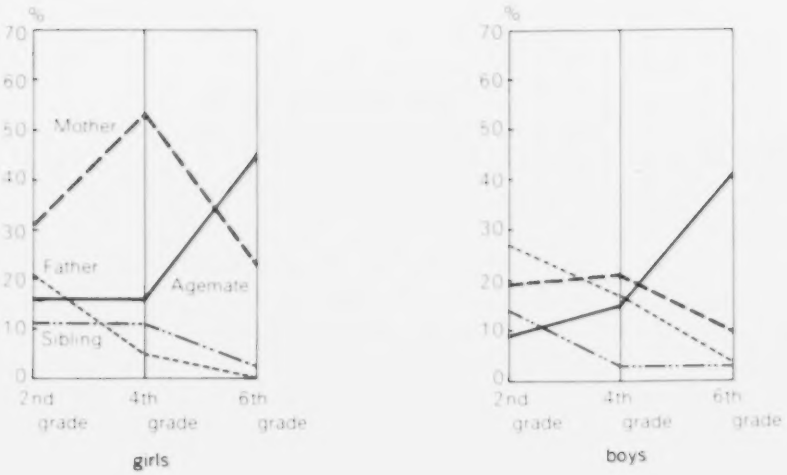

FIGURE 3. Figures Selected in PART Card of "When something unhappy happens" among Elementary Schoolers

Under the general waves of developmental changes, each child establishes her/his own framework of affective relationships. Figure 4 indicates the individual type of affective relationships in each age group. Among pre-kindergarten children, though 55% of them were identified as mother-dominant type, 7% of them were classified into father-dominant type. The mother-dominant type subjects decreased as they grew older, and both parent-dominant and family-dominant (including parents, sibling and some relatives) types increased instead till 4th grade. The agemate-dominant type children began to

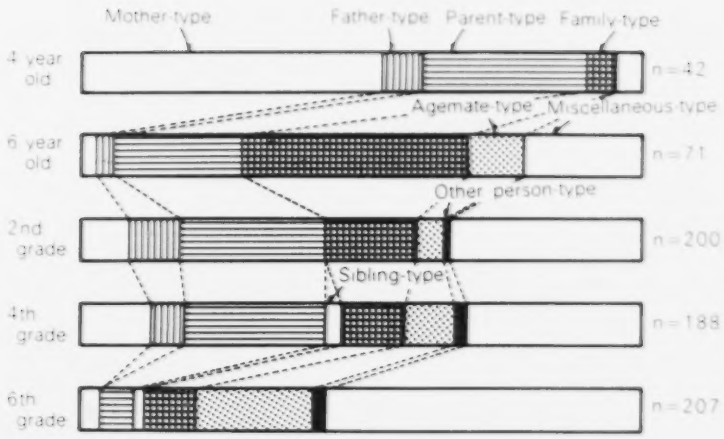

FIGURE 4. Types of Affective Structure among Children

appear among 10% of kindergarten children, and continued to increase through 6th grade. We have not had enough empirical research of the prior experiences of these agemate-dominant type children. However, the seven months' longitudinal observations after entrance to kindergarten indicated that the children who had included peers in their affective relationships before entrance much more easily interacted with agemates in daily play sessions in kindergarten. In a study elsewhere, the agemate-dominant type children behaved more cooperatively with an unfamiliar agemate partner in an experimental joint problem-solving situation than did the mother-dominant type kids (Nagata & Suzuki, 1983). The results suggest the importance of a child referent in the process of getting acquainted with agemates.

As shown in Figure 4, 59% of the 6th graders were identified as the miscellaneous-figure type. This divergent tendency in extension of affective figures can be considered as an outcome of the children continuously selecting or reassigning a more competent and suitable figure for each function under social exposures to new human relationships. Thus, the replacement of the prior figure (s) by a more competent and effective one is predominant among children in formal organizations.

The fourth stage : Appearance of focus

The fourth critical stage is for adolescents and young adults. The affective relationships may change dramatically when adolescents begin to reexamine their world existentially, trying to arrange their affective relationships to support or to be consistent with their philosophy of life or way of living, in other words their self-identity. The studies of adolescents and yound adults indicate the following two important nature of transformations of affective relationships among them (Takahashi, 1974 ; 1980). First, a focus (foci) appeared and increased as the subjects grew older (see Figure 5). Although our data among children suggest an endless process of the extension or replacement of figures, the findings indicate a centering tendency of figures in adolescents and adulthood. The focus (foci) was the figure who served the most important role, and many other figures

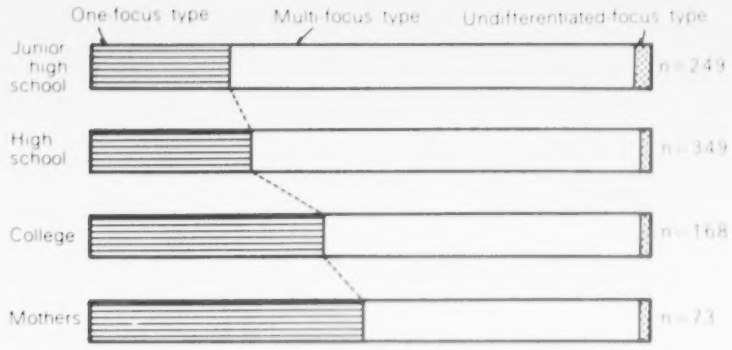

FIGURE 5. Types of Affective Structure among Female Adolescents and Adults

were assigned less important, but suitable roles. These differentiations of functions among figures suggested a structural nature of affective relationships. When the affective relationships actualized these structural characteristics, the framework could remain rather stable and independent of current environments, and substantially regulate the contents of affective behaviors irrespectively of what was going on in the world around one. The achievement of these structural characteristics cannot be interpreted independent from the self-identity which, after all, is formed by the integration of experiences. And, conversely, the stability of self-identity must be assured by the affective structure.

Secondly, though all types of affective relationships had the common structural characteristics, each type (the distributions of types are shown in Table 1) showed different affective behaviors. For example, the mother type of college students ranked the mother first in all modes of affective interactions and described her in positive-emotional terms, e. g., "My mother is a good adviser and my best psychic support". Besides the mother, they ranked the father and sibling higher than non-family members, such as friends of the same gender or a respected person. Few had a love object of the opposite sex. The mother-type students were concerned with family members and seemed not to be so active in other social interactions. On the contrary, the love-object-type students showed their interactions with many kinds of people including a number of nonfamily members. Though they defined the love object as "everything for me" and ranked him/her high in all modes of affective behaviors, they also directed affective behaviors to parents, siblings, friends of the same gender and the respected person with clear differentiations of the roles of these figures.

The further stages : Incessant transformations of affective relationships

Human beings must continue to transform their affective relationships continuously when they encounter life events. Each person idiosyncratically transforms and reconstructs her/his own relationships, experiencing those various encounters with and also separations from significant others which accompany employment, marriage, childbirth, divorce, retirement and death.

The data of the AR-Q and AR-SCT among married females (33 to 37 years old)

suggested certain transformations of affective relationships after marriage and also childbirth. That is, 42% of the seventy-three mothers, who had graduated from the same college as the subjects in the college group, 69% of whom were teaching music at school or home, were identified as husband-type. They described the husband as a figure who supported their psychic life and was an important partner in life. Though there was only one subject who was classified as child type, the mothers directed affective behaviors to their child (children) next to the husband. The child was defined as a person who made the mother feel life is worth living and whom one was forced to bear the responsibility for taking care of. Their own mother was the next important figure and was scored higher than the father and a close friend of the same gender.

The PART interviews in progress with aged persons, 61 to 78 year old, also suggest the further transformations of affective relationships. Ten out of 29 females were identified as having the child(children)-dominant-type of affective relationship, though three of them had the husband alive. Their children, 35 to 55 years old and already married supported the psychic lives of them. Fifteen of them had lost the husband through death, and stated that they could cope with the loss through psychic support by and interactions with the children. Besides the children, they included other figures in their affective relationships : the late mother and/or husband as a figure who brought peace of mind ; grandchildren as figures with whom they shared pleasant experiences and of whom they took care ; close friends to share such same-generation pleasures as shopping, chatting and flower arrangement ; other child (children) and relatives as travel partners or people to visit and/or talk with ; daughter-in-low as a familiar helper. The seven out of the eleven elderly women whose husbands were alive, assigned a more important role to the husband than those whose husband had died, though only two of them was identified as husband-dominant-type. One childless and divoced subject was identified as sibling-dominant-type. For her, an aunt was assigned the next important role. The other childless widow also included some relatives such as siblings, nephews and nieces in her affective relationships. Thus, it is suggested that human beings continuously and firmly transform their own affective relationships accompaning, coping with their changing lives and also aging.

RULES OF TRANSFORMATIONS OF AFFECTIVE RELATIONSHIPS

The conceptual model of affective relationships provides the assessing instruments and the research to trace the developmental transformations from infancy to old age. In the series of above-mentioned studies, I am mostly concerned with examining the transitions between stages of affective relationships, and the five stages are proposed to describe the transitions. The findings suggest that each subject transforms her/his own affective relationships throughout life. The course of transformations seems to me to be governed by the following three rules.

The first rule is the similarlity principle in extending affective behaviors to new figures. It is hypothesized that when subjects extend affective figures they use their prior framework of affective relationships. That is, in evaluating a potential figure they look for a suitable figure as referent who has traits similar to those of the new one, and who can somehow guide them as to whether the new figure is an appropriate one for affective behaviors or not. At least among Japanese toddlers, who usually are surrounded by

females as caregivers including aged ones, the similarity among adults was judged by gender, and age differences among female adults were not important. Therefore it is hypothesized that when the children encounter a stranger, first they will recognize the gender of the stranger, then they will select a figure, namely a referent, with whom they already have affective relationships considering the consonance of the gender. Further studies on social cognition should enrich our understanding of how people widen their circles of figures, though culture-bound customs and mores surrounding child rearing will influence the child's social cognition. That only the children who had had agemate (s) in their prior affective relationships easily played with peers of both genders in kindergarten suggested that in encountering children they would use a child as referent. Therefore, the age property must be critical in judging whether a given new figure belongs to child or adult.

The second rule is the satisfaction-increment principle in the replacements of figures of affective relationships. The findings suggest that, in the process of development, the functions of the prior figures of affective relationships are examined, and that some of these functions are moved to more competent figures. As the affective relationships concerned with the survival of human beings, children will begin to examine the potential replacements in the peripheral functions, such as playing, co-bathing and going out, and in those situations in which they are healthy, alert, happy and secure from the fear for survival. Through the continuous examinations of replacements, the functions of each figure will be clarified and also refined. The replacements of figures among adolescents and adults are influenced not only by the nature of prior framework, but are certainly affected by other factors, such as one's life style, philosophy of living, and the self concept.

The third rule of transformations is the focusing principle, that is the appearance of focus (foci) in the framework among adolescents and young adults. Though the results of the study of childhood suggest a centrifugal tendency of the extensions of affective figures, the appearance of a focus in adolescence and young adulthood indicates the centripetal nature of affective relationships. The focus is the core of the affective relationships and characterizes the nature of each type of affective structure. According to Piaget, the development must be directed from centering to decentering. However, if human beings continue extending affective relationships endlessly to new figures, their social relationships will be in flux and unstable. With the focus, the affective relationships, the core part of social relationships, will develop a certain stability and consistency, though the structure will continue its tranformations to the last as events occur. It is also plausible to hypothesize that even infants have this focusing ability in selecting the figure, in that they can make a preference of one figure another, though the focusing dose not become clear until adolescence.

Thus, affective relationships are supposed to mediate the coming social interactions and it is plausible to assume that the affective relationships of each person have consistency through transitions. If we assessed the affective relationships of a person in each stage, we would find continuity between stages. On the contrary, as previous studies did (e. g., Kagan & Moss, 1962), if we examined separately the strength of affective behavior to a given figure, we would get low or insignificant correlations between stages, which led the authors to claim discontinuity of social behaviors. However, the discontinuity of the

strength of affective tendency toward a given figure is not incompatible with the continuity of the overall nature of affective relationships in each person.

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